The Builder.

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From Australia.

WE purpose in the future to give our readers some periodical information in regard to architectural progress in the Australian Colonies, as well as to undertake some criticism as to the course of architecture in the cities of that fifth continent; still few, but increasing in size and importance, and which may have before them a great architectural future, especially when they can emerge, as the Americans are now beginning to emerge, from the mere reproducing of European types of architecture, and proceed to develop an architecture of their own; if not exactly a new style, at all events a new treatment arising out of the circumstances of climate, materials, and mode of life. We cannot say that we have seen any signs of this so far, but we have little doubt that the time will come for Australia to play her part also in contributing a fresh chapter to the history of the world's architecture. In the meantime, it will probably be of interest to our readers to have some regular information as to the present condition of architecture and of building work in the leading cities of Australia.

With this intention in view, it may not be out of place to give here a few general notes as to the country, and as to the physical and social conditions under which our Australian relatives live; otherwise English readers might fail to realise the why and the wherefore of much that we may have to record.

In the first place, this island continent is four-fifths the area of Europe, and extends from the 10·39° to the 39·11½° parallels of latitude. The climate of the northern half is therefore tropical and sub-tropical, and the southern sub-tropical and temperate; but in no part, except on the highest of the southern mountains, does the average yearly temperature approach that of England in coldness. To illustrate this we give below the principal cities of Australia, and in a parallel column, well-known cities in the northern hemisphere, having about the same mean annual temperature, and also their respective latitudes north and south of the equator:—

Melbourne ...	37·52	S	Madrid	40·28	N
Sydney.....	34· 0	S	Naples.....	40·50	N
Adelaide	34·56	S	Cairo	30·04	N
Perth	31·50	S	Smyrna	38·25	N
Brisbane	27·10	S	New Orleans	30·07	N

The above are the capitals of their respective colonies, and they are all situated in the southern half of the continent.

Australia does not possess the great ranges of mountains that are so marked a feature of European scenery, but there is an elevated range of considerable width, commencing at the northern extremity of Cape York, and running parallel to the eastern and southern coast, and finally dying away near Adelaide. The highest point at Mount Kosciusko reaches 7,308 ft., but the average is only about 3,000 ft. There are other isolated ranges dotted over the vast expanse of the continent, but they are not of sufficient height or area to materially affect climatic conditions. The consequence of this is that the narrow slip of coast-land between the mountains and the sea is well supplied with rivers, and has a good rainfall, but in the interior there is only one great river system—viz., that of the Murray, and its still more important tributary, the Darling. The greater part of central and Western Australia is, therefore, characterised by a climate of Egyptian dryness, the rainfall varying from 2 to 4 in. per annum. The monsoon rains of the tropics, however, spread over a considerable portion of the northern section of the continent, and the rain-clouds of the great southern ocean perform a like duty at the other extremity. Between these belts is one of calm, and its natural condition is drought. Variations in the position of the rain-belts of a few hundred miles are, however, of frequent occurrence, hence the frequent disastrous floods in the interior of the usually dry portion of the country. In a great part of Australia it is alternately a year of flood and then two or three of drought: in colloquial speech, it is a "feast or a famine." The rains, when they do come, are often of tropical violence, and when driven up by a southerly storm, few walls will resist their penetrating power. How best to meet the effects of great heat and driving rain is therefore a problem which materially influences the architectural treatment of Australian buildings.

We have hitherto referred only to the mainland, but the delightful little island of Tasmania, and that England of the south, New Zealand, must not be passed over without a word of notice. The former is distinctly temperate in climate, with a good rainfall, and the two islands of the latter stretch themselves over a length of 1,100 miles, from 34·30° to the 47·30° parallels of latitude. Auckland at the northern end possesses a climate much like that of Sydney, while Dunedin and Invercargill in the south are as cold as Scotland; and the province of Otago is, in fact, appropriately populated in great measure by the hardy sons of North Britain. New Zealand is distinctly mountainous, Mount Cook in the south island reaching a height of 12,349 ft., and in the north island volcanic phenomena are of frequent occurrence. The rainfall is abundant, and an Australian drought unknown; but tempests and occasional earthquakes detract from an otherwise beautiful climate. These earthquakes render brick or stone structures undesirable in the north island, and, as there is an abundance of good timber, the buildings are mainly of wood. In the south island the same limitations do not apply, but cheapness still causes wood to be largely employed, though of late years permanent structures of brick or stone are becoming much more frequent.

The population of Australasia is very largely composed of emigrants from the British Isles, the proportion of Germans and other European nationalities being so small, except in certain special localities, as to have no influence on the marked British characteristics of the people. Much political capital is made out of the presence of a few thousands of almond-eyed Chinese, but except in the northern territory and Northern Queensland they may be ignored in any discussion of new problems. The native "blackfellow" of Australia is fast becoming extinct, and is only to be found in any numbers in the uninhabited wilds of the north and west, while in New Zealand the Maori, though semi-civilised, is nevertheless doomed. The total population of Australia amounts to over three millions, and of these the great majority are located in the mountain and coast lands of the east and south. Out of the total, New South Wales and Victoria each claim over a million; South Australia and Queensland divide the remainder between them, except a meagre 40,000 located in the

v st territory of Western Australia. One very noticeable feature of the distribution of the people is the remarkable position taken by the capitals of each of the three southern colonies. It is a case of Melbourne, Sydney, and Adelaide being first and the rest of the towns nowhere. Sydney has a population of just under and Melbourne a little over 400,000, a full third of the total population of each colony. This concentration in the chief cities is an evil that may have disastrous effects in the near future unless the tendency to congestion is modified. It is an unhealthy sign in a country of unlimited material resources crying out for development. The only exceptions are Ballarat and Sandhurst, in Victoria, which have been made by gold, and Broken Hill and Newcastle, in New South Wales, whose prosperity depends respectively on silver and coal. The cause is not far to seek. Railways have so quickly followed settlement that local centres have had no chance of growth. The consequence of this is that outside the capitals there is no scope for the architect, engineer, or builder, and all the best work in the country districts is carried out from the cities. In New Zealand the same difficulties do not exist, as Auckland and Wellington in the north island and Christchurch and Dunedin in the south divide the honours, and several other towns take a good second place. They are all on the coast, and intercommunication is mainly by sea; hence every district requires its own commercial centre.

The first impression an Australian city makes on the visitor from the old country is that of airiness and spaciousness, and the next a depressing feeling of stiffness and uniformity. The former is owing to the width of the streets and the frequent reserves, and the latter to the rectangular plan on which they are nearly all laid out. Adelaide is the most striking example, and in many respects is unique. The city proper is a rectangle of one mile by a mile and a quarter, divided into four equal sections by tree-lined streets 132 ft. in width. At the crossing in the centre a large square has been formed and planted with trees and shrubs, and round it most of the public buildings are located. In the centre of each of the four sections is another smaller square; and broad streets, none less than 66 ft. in width, sub-divide each quarter. Around the city stretches a belt of park lands, one-third of a mile broad, and beyond this again are the suburbs. The plan is an ideal one, and possesses many advantages, but among the practical defects are want of diagonal communication, and a too rigid uniformity of line.

In the planning of Melbourne there is no such leading idea. The city is mainly laid out in rectangular blocks, and but for the fact of the slightly undulating surface of the central portions, and the placing of the same at an acute angle with the surrounding suburbs, the result would be very monotonous. The two chief streets, Collins-street and Bourke-street, are wide, and gently dip towards the centre of their length, so that the view, especially from near the lower end, is fine. At the upper extremity of the former stands the Treasury Building, while the new Parliament House faces the latter. Local quidnuncs would prefer them away, but those who know the value of a fine termination to a vista fully appreciate the wisdom of the Government which placed them there. There are several fine boulevards or avenues leading out of the city, or rather they will be fine when the trees are fully-grown; and some are of great width, consisting of three roadways and two footpaths separated by rows of trees. Indeed, all through Victoria, tree-planting in the streets of the towns has been carried out with great vigour, and succeeding generations will reap abundant benefit, both in comfort and beauty, from the forethought of the men of our own time. It is an unfortunate thing that in New South Wales tree-planting has been neglected, probably owing to the example of the capital, the streets of which, in comparison with those of Melbourne and Adelaide, are decidedly narrow, and so leave barely sufficient space for traffic in the busiest portions.

It is difficult to describe the plan of Sydney. It is a growth, and is therefore more like that of an English town than any other in Australia. In the first place the city is situated on the shores of one of the most beautiful harbours the world possesses, which is indented at all points by deep bays or coves. At the head of one of these and on the banks of a small stream of fresh water the first explorers founded a settlement, and as the surrounding country was occupied bullock tracks were formed thereto and thus laid down the lines of the principal streets. As may be expected, they are neither quite straight nor perfectly parallel, but to the eye-wearied traveller fresh from the prim regularity of Adelaide and Melbourne this is no defect. As the city grew, it occupied the various points jutting out into the harbour, and with the building of the railway to Parramatta, fifteen miles inland, suburbs began to spring up thereon. Then, owing to its proximity, people began to flock over to the opposite side of the Harbour, called the North Shore, a district which promises ere long to become another city. With the extension of steamer traffic on the harbour, small settlements have been made at almost every available point, and thus it is dotted on all sides with human habitations, and in the not distant future these now separated settlements will form part of one vast city. This outlook, though it may seem sanguine, is almost certain of realisation, in consequence of the natural advantages of Sydney as a commercial port, and its position in the centre of the great coalfield of Australia, which must eventually make it the headquarters of Australian industry. In writing thus, we are fully aware of the great start Melbourne has attained in this direction by the aid of protective duties and the well-known energy of the Victorians, but in the end the great natural advantages of Sydney must operate with telling effect.

Passing north to Queensland, its capital, Brisbane, lies on each side of a comparatively small river at a distance of about twenty-five miles (by water) from Moreton Bay; and though everything has been done to foster its trade it can never rival either of the southern capitals. Queensland has several other natural outlets which will develop *pari passu* with the capital, and so prevent the latter's abnormal growth. As a city it is not very interesting, the planning on the flats being of the familiar rectangular type; and the suburbs on the hills, though pretty, have not been made the most of, many of the roads being very steep, whereas by judicious planning easy grades might have been secured. Important as this is further south, it is doubly so in a sub-tropical climate like that of Brisbane, where the saving of unnecessary exertion is a most essential point. Of most other Australian towns it is only necessary to say that the rectangular system of planning is the prevailing one, and this after a time becomes so depressing to the eye at all trained to appreciate beauty of line that any variety, however slight or accidental, is hailed with delight.

THE WOODS AND FORESTS LONDON PROPERTY.

IN a note in our issue of August 23, we set out *verbatim* the part of the report of the Committee of the House of Commons which dealt with the London property of the Woods and Forests Department. This Committee was first appointed in the session of 1889, and was re-appointed in that which has lately come to an end. The subject of the inquiry was one of much importance, but we are now concerned only with so much of it as deals with the London property of this department. It is desirable, in the first place, to clear up a popular mistake, namely, that the Crown estates, or, in other words, the estates under the administration of the now very absurdly named department the "Woods and Forests," belong to the Sovereign. On the contrary, they are administered for the benefit of the nation, and the revenue obtained from them is paid into the National Exchequer. For the year ending March 31, 1889, the net income was 430,000*l.* The estimated rateable value of the Crown property in London is 900,000*l.* Mr. Cates, who has the management of it, states that if all the property were in hand, the annual rental would be about 1,000,000*l.* a year, as compared with the present annual rental of 250,000*l.* Thus the Crown estates form a valuable national asset, and the "unearned increment," as the phrase is, goes not into the pockets of the landlords of the country, but into those of the tax-payer. The recent inquiry thus shows that the importance of the department, so far as the metropolis is concerned, is increasing, and we think that the Committee have rightly resolved that the Commissioners should take a more responsible part in its management. But we take it that the Committee in making the recommendation in no way consider that there is any hostile criticism to be made against the management of the London property by Mr. Cates. On the contrary, it is obvious that his management has been so capable that the Commissioners have not taken more than a nominal part in looking after the Crown property in London. This is not surprising, for Mr. Cates is a person, as his professional brethren know, of great capacity and experience; whilst neither of the two Commissioners, Mr. Culley and Sir Robert Kingscote, are men of sufficient calibre or experience to overrule his views. Of course, in justice to them, it is fair to point out that a competent Surveyor of long practice is necessarily a better judge of the routine business of the management of house-property than an ordinary official can be. Thus, when a lease is about to expire, the main question is, what shall be the future rent? It is obvious that Mr. Cates is a better judge of this than most Commissioners would be. On the other hand, a Commissioner who went into these details carefully would in a comparatively short time be able to form a competent judgment on such matters as these when assisted by skilled opinion. It appears to us that as each lease approaches its end, the amount of the future rental, the person to whom the new lease shall be offered, whether it shall be offered to the occupier or put up to public competition, should be considered by the Commissioners. It is clear, for example, from the evidence given by Mr. Cates, that a new lease of Crown premises is always offered in the first place to the occupying tenant, though he may be only the sub-tenant of the actual lessee from the Crown. But though this seems to be *primâ facie* a sound general principle, it ignores the actual lessee; and we can see no reason why the actual lessee from the Crown should not have as much right to the new lease as the occupying tenant. Mr. Cates has been desirous of getting rid of the middle-man, which, again, is a sound general principle to act upon. But it is also a sound principle that the person with whom the original contract has been made has a fair right to expect that on a renewal of the lease he or his representatives will have the preference in regard to a new lease.

Mr. Cates states that in the Crown leases there is no stipulation against sub-letting. It would, he thinks, be wiser if such a clause were inserted in all future leases. Then the actual possessor of the lease, either the original lessee or his representative or his assignee, would naturally and rightly have the preference in the granting of a new lease. When sub-tenancies have been created, then we cannot but think that each case should be considered on its merits, and that the occupier or sub-lessee should not *primâ facie* be considered as having a greater right than the lessee or his representatives. A very important question is also raised by the Committee—as to whether a scheme of periodical renewals to anticipate the closing of the lease

in its natural course and then gradually to raise the Crown income should not be established. They consider that this point should "be carefully considered by the Commissioners." It is difficult to understand why the Committtee do not themselves give a definite opinion upon it. It is a subject, indeed, rather for the Chancellor of the Exchequer than for the Commissioners, who are only managers of this property. It concerns the national finances, and it is a point which should be settled by the responsible Finance Minister of the country, the details being worked out by the Commissioners with professional advice. That a scheme of renewal on a proper basis would be desirable we cannot doubt. It would prevent any question as to the person to whom a new lease should be offered, since the privilege of renewal would necessarily belong to the lessee alone, and it would enable the value in the improvement of the Crown property to be more certainly estimated for revenue purposes, and to come earlier into the public exchequer. It would also give a greater security of tenure to leaseholders of the Crown. The latter would, in fact, have perpetual tenancies, subject to the performance of the conditions in their leases and to the payment of certain fines or increased rents, which would be known from the very moment that they became lessees of the Crown. We believe that such practice exists on Lord Derby's Liverpool estate, though it does not seem to be the same on the London estates of the great landlords. Mr. Cates's practice is to arrange the terms of a new lease with the occupying tenant "about a year before the expiring of the lease." This gives the lessee or the tenant too insecure a tenure. The latter, it is obvious, does not know, until a short time before he may be turned out, on what terms he may remain in; and the former, whether he likes it or not, has to give up his interest. Crown leaseholds should, as nearly as possible, have the attributes of freehold property, and to give it these a scheme of renewals must be in force. If a tenant, when such a scheme exists, does not care to make use of it, he has no one to thank but himself.

THE PRINCIPLES OF PROPORTION AS PRACTICALLY EMPLOYED IN THE PARTHENON.*

BY W. WATKISS LLOYD, F.S.A.

IT will be observed that the open space between the columns of nearly 8 ft. is so ample relatively to human dimensions as to give no suggestion of inconvenient narrowness for two persons entering together.

The columns of the pronaos are smaller than those of the peristyle, and their columniations are also somewhat closer (13·736 : 14·090). The consequence is that each ranges somewhat nearer to the axis of the plan than the peristyle column, which is partly in front of it. The difference is exaggerated at the angles from the close spacing of the columns of the peristyle by the angle both front and flank; this has the happy effect of giving greater openness to the ambulatory at the corners, and allowing an uninterrupted passage of light through the second columniations on front and on flank.

The columns of the pronaos compare with those of the peristyle very nearly in the proportion of 6 : 7 by diameters. 7 : 6 : : 6·245 : 5·352—cf. 5·402 measured. This is a pair of numbers, of which the squares also approach a simple proportion, viz. (49 : 36) 4 : 3. If we square the diameter of the peristyle column we have 39·0, which by ratio 4 : 3 gives 29·25 for the square of the diameter of the pronaos column, and the root of this number 5·408 is still nearer to the measurement than the result obtained by direct comparison of diameters.

The like comparisons worked out between the west peristyle and posticum columns give us:—

Diameters 10 : 9 : : 6·251 : 5·626; cf. 5·632 measured.

Areas 5 : 4 : : (6·251² =) 39·07 : 31·256 (=5·590²).

In this case, therefore, the exacter result is given by ratio of diameters.

The platform of the cella with its two porticos has the proportion of breadth to length of 7 : 19.

Of this oblong an exact square is assigned to the Posticum, Opisthodomus and partition wall.

71·330 : 71·334 by Penrose's independent measurements.

The remaining rectangle has consequently the proportion of 7 : 12 comprising the naos and pronaos; this is the proportion of the front of the temple from level of stylobate to apex of pediment.

The plan of the naos in the interior, the chief and most sacred apartment, has very exactly indeed the proportion 9 : 14, or the same which, as we shall see, obtains between the breadth and full height of the front.

9 : 14 : : 63·010 : 98·015 (cf. 98·095 measured).

The hundred Attic feet which justified the title "Hecatompedon" as applicable specially to the naos, extend to midway of the front wall,—the line, in fact, of the doors. In consequence, if the façade of the temple were drawn to scale and laid down on the plan of the naos, its bounding lines would be exactly contained within the flank and end walls of the naos.

The nearest, but by no means satisfactory approach of the interior of the opisthodomus to a simple proportion is, 11 : 16.

16 : 11 : : 63·01 : 43·318 (cf. 43·767 measured).

The naos column is in proportion to that of peristyle as 7 : 12 by diameters, and to its inter-column as 3 : 4.

The aisles taken jointly and upon the centre line of the columns give a dimension comparing with breadth of nave as 3 : 4.

The coincidences of proportion were, of course, no matter of mechanical deduction, necessary consequences from foregone assumptions; they were, doubtless, conclusions obtained after a series of trials and adjustments conducted only under guidance of the principle to search for special proportions compatible with available and appropriate arrangements.

By the established Doric system a triglyph was to be placed exactly central over each joint of the architrave stones, and between each pair of these, another intermediately. But if equal spacing were observed rigidly, the architrave must finish at either end with a half triglyph, and the architrave stones would only extend as far as the centre of abacus of the columns at the angle. It was probably to escape this anomaly that the angle columniations were first contracted and the angle column brought entirely under the architrave stone, though some advantage in effect must have been recognized in this departure from uniformity, otherwise we cannot doubt that a different solution of the difficulty would have been found. The architects, however, elected to allow the anomaly of finishing the architrave with a complete triglyph, which did not in this case centre with the axis of the column beneath it. But the further consequence now ensued that the extra half triglyph admitted on the architrave would pinch the space for the adjacent metopes. This difficulty was got over or alleviated by the angle architrave stone encroaching on its neighbour and extending beyond the axis of the second column, and so the irregularity was distributed and dispersed.

On the east front of the Parthenon the lengths of the architrave stones are:—

15·227—13·966—13·889—14·210—14·126—13·617—15·260—

The metopes:—

4·160—4·066—4·061—4·050—4·282—4·295—4·320—4·375—4·169—4·186—4·195—4·192—4·120—4·121 S.E. (Penrose, p. 16).

As a triglyph is placed very accurately over the centre line of each of the intermediate architrave stones, the metopes fall into pairs which are very accurately of the same breadth: 4·282, 4·295; 4·195, 4·192, &c.

The central east architrave stone gives the widest pair, 4·320, 4·375; the pairs of architrave stones on either side are somewhat shortened to accommodate the anomaly of the extra half triglyph on the terminal architrave stones, and the breadths of the several pairs of metopes are more or less reduced in consequence.

Apart from these subordinate variations, the average proportion of the breadth of the triglyph to that of metope is 2 : 3.

The full length of the frieze on east front allowing for slight setting back from the architrave (0·067 × 2 = 0·134) is 100·161 to accommodate 14 metopes and 15 triglyphs, and in view of the given proportion divisible into 72 aliquots—

$$\left.\begin{matrix}14 \times 3 = 42\\ 15 \times 2 = 30\end{matrix}\right\} \div 72. = 1{\cdot}390$$

1·390 × 2 = 2·780 for triglyph compares with { N.E. 2·786 / S.E. 4·765

1·390 × 3 = 4·170 for metope, compares with { N.E. 4.192 / S.E. 4·126

The metopes towards the centre measure 4·330, 4·282, &c., by excess over calculation, which is compensated for by reductions above the shorter architrave stones towards the sides, 4·064, 4 066, &c.

At the south angle of the east front the space between the two super-columnar triglyphs is, as in most other cases, accurately divided by the inter-columnar triglyph, making the metopes on either side equal; but at the north angle there is a difference. This is due to the second architrave stone being shortened, to the advantage of the third. The contrasted dimensions are these:—

S.E. 15·227—13·966—13·889—14·210.
N.E. 15·260—13·617—14·126.

The metopes are so reduced above the short architrave stone that the slant face of the southern half triglyph had to be cut away to make room for the sculpture.

Had the last inter-columnar triglyph been set quite symmetrically, it would have given metopes of uniform breadth, 4·129, to compare with the corresponding metopes at the other angle, 4·126 and 4·120. But the architect preferred an unequal division, which made the southern metope just equal to those above the short architrave, viz., 4·066. This leaves 4·192 for the last metope, which compares with the breadth of the corner metope very nearly as 3 : 2.

3 : 2 : : 4·192 : 2·794 (cf. 2·786 measured).

It seems clear that the architect, having to deal with an inevitable irregularity in disposing of the terminal half-triglyph, contrived to distribute it, and in doing so deliberately avoided giving emphasis to rigid uniformity in parts adjacent. As we have seen, he did not deal with the difficulty exactly in the same way at both extremities of the frieze. It was probably due to like considerations that he allowed more irregularity in the columniations by the angles than to any others. Perfect uniformity throughout was excluded by the nature of the case, and the want of it was in some degree concealed by the departure from uniformity, though under strict limitations as we shall see, not being exactly repeated or so concentrated as to declare itself by direct contrast with the uniform.

It is worthy of remark that the breadth of the triglyph compares with the lower diameter of the peristyle column in the ratio, so frequently employed in the Parthenon of 4 : 9.

9 : 6·25 : : 4 : 2·770 (cf. 2·76 measured).

This may possibly be a coincidence which was never weighed or recognised; but the two dimensions are very naturally compared, and the recognition of their proportion so favourably, may quite as probably have had its influence in deciding the precise proportion of triglyph to metope which conciliated it.

We have now gone through a consideration of the chief elements of the design and its distribution, which concern or are in direct dependence on the ichnography of the temple,

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* The first part of this paper, with a number of illustrations, appeared in last week's *Builder*.

to the plan and distribution of the plan. It remains to treat of the orthography,—that is to say, of the elevation of the temple and the proportions which the architect assigned to its component parts.

The accepted laws of the style determined that the columns of the portico were to stand upon a basement of some solidity, and to support an entablature consisting of architrave, frieze, and cornice; the entablature in its turn being crowned by a low triangular pediment, with its own cornice following the raking outline.

The chief contrast, the dominant antithesis in this combination, is between the vertical and horizontal members; that is, between the upright column and the laterally extended hypostylia and epistylia.

It will be seen that there is a distinct analogy between this relation and that between the solid columns and the void interval of intercolumn, which we have already found to be subject to a regulative proportion.

The first comparison to be instituted is, therefore, between the height of the column and the joint height of the horizontal members as another term. The expression of the architecture depends as importantly on the closeness of the interval between entablature and basement, relatively to their mass, as on that of the void interval of the columns relatively to their girth.

There is some appearance that in the earlier Parthenon the diameter of the column exceeded the inter-column, but in the later temple this is only the case with intercolumns and columns by the angles of the peristyle. Otherwise both on front and flank the superior breadth of the inter-column as five to the diameter of the column where it is greatest as four, throws the balance in favour of a sense of inviting admittance, above that of exclusion. And so we find that, in accordance with the analogy between the cases, it became a canon with the Athenian architects to throw the balance, even in their most majestic buildings, in favour of lightness as against solidity,—that is, to assign a larger proportion of the total height of a façade or pedimented portico, to the vertical member, to the column which gives the measure of the interval between epistylia and hypostylia. Consistently with this principle, the increased proportion of height given to the column in various buildings of fine style, was correlative to an increase of openness in the spacing of the columns.

We have already accepted the full height of the front as 65·185 measured; of this 34·253 is given to the column, and this dimension compared with the complement 30·932 available for joint height of the horizontal members, is in the proportion 10 : 9—

10 : 9 : : 34·308 (cf. 34·253 measured)
: 30·877 (cf. 30·932 measured).

65·185 ÷ 19 = 34·308 { ×10 = 34·308
{ × 9 = 30·877

65·185

In this proportion, 9 : 10, we have an example of a further extension of the canon. It is, that not only shall the height of the column be the superior term, but that the ratio adopted shall always be a super-particular ratio,—a ratio of that simplest form which has a difference between its terms, of unity. At Sunium the ratio is 7 : 8; at Bassæ, 6 : 7; at Rhamnus, 5 : 6; in the Theseum, 4 : 5.

All these are Doric temples, and the successive ratios indicate progressive lightness or openness of composition. In the Ionic temples this progressive development is naturally carried further, through the ratios 3 : 4, 2 : 3, and, finally, 1 : 2, which is the limit, when the height of the column is just double the complementary joint height of the upper and lower horizontal members.

When still even this degree of lightness did not satisfy the Ionic architect, he resorted to an artifice which gave him further licence while plausibly conserving adherence to the canon; he reckoned the shallow base and capital of the Ionic column as pertaining to the horizontal members, and made the shaft of his column alone double that of this enhanced complement.

It was a further canon of the Athenian architects, confirmed by a number of comparisons, that the height of the column should not only satisfy these conditions in rectilinear proportion, but that it should also fall in with a rectangular proportion in the very simplest form by agreement with a definite spacing on plan; that is to say, the height of column proves to give a dimension which accurately measures off an interval on plan of the colonnade, of which the terminal points coincide with the margin of diameter or with the centre of plans of the columns. In some cases an option is accepted of taking the angle column and adjacent contracted columniation into the comparison. This is the case both at Bassæ and Rhamnus, where the symmetry extends from the angle column inclusive to the centre of the third column. In the Theseum a like symmetry holds good, only taken upon the plan of interior columns exclusively. At Sunium the rectangular symmetry includes the full diameters of three interior columns and their two intercolumns. This also is the scheme which is recognisable in the Parthenon as a distinctly controlling relation.

The extent of three diameters and two intercolumns measured on the east front averages 34·443, which nearly agrees with the height of the middle columns, if, with Mr. Penrose, we include the curvature increment above the level line joining the angles of the steps (p. 13), 34·253 + 0·225 = 34·478 (error = ½ in.).

The height of the column at the angle is, however, the term adopted in relation to the general division of heights of members.

Again, it appears to be so frequent a usage in Doric architecture as almost to attain to the strictness of a canon, that the breadth of the abacus of the column should have either a rectangular proportion of one-fifth to the height of the column, or a rectilinear proportion to the breadth of the top step, or both.

The Theseum abacus is one-fifth of the height of the column, and one-twelfth of the top step; at Bassæ the abacus is again one-fifth of the height of the column, but it is not commensurable with the top step. In the Parthenon the broader abacus of the angle column on the east, is one-fifth of its height; the smaller ordinary abacus of the same front is one-fifteenth of the top step; that is to say, its breadth is obtained by dividing that of the top step by the joint number of the eight columns and their seven inter-columns.

On the west front and south flank, a different and reduced breadth is adopted for the ordinary abacus, obtained by giving it a proportion of seven to eight to the inter-abacal space.

On the north flank the width of the abacus is curiously varied; they diminish from the east where they adjoin to the largest examples towards the west front, where they are smaller. Nothing could have been more simple than for the masons to turn out any number of these square blocks exactly equal in size; we must therefore assume that these variations, controlled as they appear to be by a certain method, were deliberately adopted with all the extra trouble they entailed, for the sake of precluding, though by an artifice which would escape the keenest observer, the dryness of pure repetition of absolute uniformity.

The height of the shaft of the column equals lower diameter 6·251 × 5 plus 0·168, or just 2 in. (31·423 ÷ 5 = 6·284 cf. 6·251 measured). The agreement is near enough to be noted though scarcely to be insisted on.

The leading principles in the proportioning of the entablature seem to have been that the soffit of the architrave should exceed, and its height be less than, the upper diameter of the column; that the frieze should be equal in height to the architrave; and that the height of the entablature, including cornice, should somewhat exceed the free interval between columns at their upper diameters.

These conditions are effected in the Parthenon by giving a height to the cornice on the fronts of 10·793 (1·951 + 4·417 + 4·425) which conciliates a very remarkable and important proportion.

The height from the top step to the line of cornice, which is thus completed, is 45·046, which compares with the breadth of top step exactly in the same ratio 4 : 9 as the top step to the same on flank.

9 : 4 : : 101·341 : 45·0426 (cf. measured 45·046).

We have, therefore, the continued proportion; as the length of the flank of the platform is to its breadth so is that breadth to the height of the order erected upon it. We may hand over to the theorists of the doctrine of probabilities to compute the chances of this significant coincidence within such a relatively minute quantity 0·0034, occurring by chance.

As regards the entablature itself, the soffit of the architrave exceeds the upper diameter of the column in the ratio 6 : 5 (4·883 : 5·859—cf. 5·845 measured.)

The mean height of frieze and architrave, 4·421, compares with the upper diameter of the column nearly in the ratio 9 : 10.

9 : 4·421 : : 10 : 4·901 (cf. 4·883 measured.)

The full height of the entablature equals just one-third of the extent on plan of the three columns by the angle with the included intercolumns.

32·439 ÷ 3 = 10·813 (cf. 10·793 measured.)

Thus each column is responsible for an exact rectangle of entablature.

The determination of the upper diameter of the column will be considered with the scheme of proportion of the column generally.

The proportion of 4 : 9 has still a further continuous application with a slight modification. By adding to the height of the order the fillet of the cornice of the pediment which is returned along the flank, we obtain the dimension 45·102, which compares with the complement of height, that is, heights of pediments and steps jointly, in the stated ratio.

9 : 4 : : 45·102 : 20·045 (cf. 20·131 measured).

The same addition to the cornice brings it up on the flank to half the height of the frieze,—with which independently of this it compares closely in the proportion 4 : 9.

9 : 4 : : 4·417 : 1·963 (cf. 1·951 measured).

What is of more importance to remark is that the height which is assigned to the steps, 6·058, makes up with the flank entablature, including this slightly-enhanced flank cornice, very nearly half the height of the column; 6·058 + 11·082 = 17·140 × 2 = 34·280 (cf. 34·253 measured), or 34·253 ÷ 2 = 17·126 to compare with 17·140 measured. The height of the steps so obtained or accepted comes out with proportion to the entablature of 6 : 11.

11 : 6 : : 11·092 : 6·050 (cf. 6·058 measured).

In the prosecution of this analysis the principle has been kept in view—in submission, I may say, to a suggestion of my late friend Professor Cockerell—to follow out a process of development from superior to subordinate dimensions, to deduce, so to speak, the branches from the trunk, to decide the dimensions in the first instance, which may seem to have necessarily limited the ulterior subdivisions. But it is not to be supposed that we can in this way assure ourselves that we are following the process of the designer. So far as we have gone no reason has appeared why the design might not have been settled up to the top of the cornice by a consistent scheme of proportional division without regard to the pediment or consideration of the height to be assigned to it. But that height decides itself, and becomes a condition anterior, within narrow limits, when once the breadth of the temple is decided on. The rise which is given to its raking lines is about 1 in 25, and this is so nearly the constant rule in the roofs of the Athenian Doric structures, that we must assume that the height of the Parthenon pediment was decided by it approximately, when once the 100 ft. of the top step was decided. The rule was not so

rigid as to enforce absolute precision, and absolute height would also be liable to be affected by the degree of projection allowed to the cornice at the angles from which the slope line of the corona started, and then by the optional height which might be given to the corona; but these differences would be slight variations of a total height which could not be less than between 13 and 14 ft.

We are, therefore, bound to admit that while the architect sat down to design his front upon the absolute basis of a breadth of 101·341 ft., he had the second condition to bear in mind in adjusting his proportions that they must be such as to allow for a pediment only variable within narrow limits of height. What he worked for was to realise a temple having its specific character of dignity by well-selected proportions of parts in accordance with the general character prescribed by the norm of the Doric style. It is but a conjecture, but it is plausibly conceivable, that in the tentative processes of embodying his ideal, he followed out first the suggestions which were presented by regarding chiefly the condition of an assumed height of pediment, and then in turn by the independent ordination of columns of various proportions, until he was satisfied by hitting on those combinations which so happily conciliate both processes and form a plexus of harmonies of which the artifices defy attempts to unravel.

The dimension which is left over for us for the height of the pediment by the analysis adopted, is about 13·97, and the measured is 14·073. This dimension agrees with the second columniation of the front south-east 14·078, and with the third south-west 14·084. At the same time it completes a total height of front which gives the proportion to top step, as we have seen, of 9·14; and a height from the top step to the same of 7·12.

Cornice and tympanum have a relation of solid and void analogous to that between column and intercolumn, and a certain harmony of gradation results from the similar dimension being distributed in contrasted proportions.

The vertical height of the cornice of the pediment at the apex compares with the horizontal cornice in the ratio of 4 : 3.

4 : 3 : : 2·601 : 1·950 (cf. 1·953 measured).

The breadth of the south-east angle abacus is 6·857, and height 1·150, this is more than one-sixth; and the shorter examples are many of them higher; at the same time the sixth of the angle abacus approaches the average height of the abacus generally—

6·857÷6=1·143 (cf. 1·149 "F. C. P.," p. 15).

The height of the capital varies little for angle and ordinary columns. It is given by the ratio of 4 : 9 to the diameter of the angle column.

9 : 6·378 : : 4 : 2·834 (cf. 2·833 measured).

Penrose's plate 14 gives 2·810 as height of capital of the northern of two central columns, east front, of which abacus takes 1·145, echinus and necking 1·675.

The approach to the ratio 2 : 3 is not close enough to be relied on.

It is pointed out by Mr. Penrose (p. 15) that the upper diameter of the column is proportioned to breadth of the abacus in the ratio 13 : 18; these are high numbers, and the agreement may be a coincidence; but the proportion is in the normal series of ratios with difference of 5, and may have been welcome in addition to other determining considerations.

13 : 18 : : 6·756 : 4·88 (cf. measured upper diam. 4·883).

Mr. Penrose also notes (*ibid.*) that the diminution of the column which gives the upper diameter, is at the east end ·683 and at the west ·685, which is exactly (34·253÷50) 1-50th of the height of the column.

Of the south-east angle column the diameters are—

Lower diam.....	6·378²	= 40·68
Upper diam.....	4·989²	= 24·89
Diam. of echinus...	6·733²	= 45·33

The upper and lower diameters compare directly as 11 : 14, but the corresponding sectional areas which are as the squares of these diameters, give very exactly the normal ratio 8 : 13.

The sectional areas of upper diameter and echinus come out very exactly in the ratio 9 : 10.

The lower diameter of the column of the pronaos is derived from that of the ordinary column east front, either by ratio of diameter—

7 : 6 (6·245 : 5·352 cf. 5·402 measured).

Or more exactly by ratio 4 : 3 of sectional areas.

4 : 3 : : 39 (=6·245²) : 29·25 (=5·408²).

The diameter which is given for the naos column compares with that of the pronaos, by diam. as 2 : 3, and therefore by sectional area as 4 : 9; but much more exactly with the peristyle column by diameter as 7 : 12, a normal of Parthenon.

12 : 7 : : 6·245 : 3·643 (cf. 3·656 measured).

The naos column is proportioned to its inter-column as 3 : 4.

It may be noticed here that the due subordination of the Propylaea to the Parthenon columns, is effected by giving them a diameter in the ratio of 9 : 11, or sectional areas proportioned very nearly as 2 : 3.

3 : 3·9 (=6·245²) : : 2 : 2·6 (=5·098²).
11 : 6·245 : : 9 : 5·109 (cf. 5·110 measured).

The small Doric column of the Propylaea is porportioned to the larger by as 11 : 16 by diameters.

16 : 5·11 : : 11 : 3·513 (cf. 3·516 measured).

We have now reviewed the chief proportions of this supreme achievement of Hellenic architectural genius, the Parthenon. In looking back through our comparisons it will be observed that the architect confined himself to a remarkably restricted scale of well-distinguished consecutive ratios; that he employed the same ratio over and over again, now upon one scale of dimension, now on another, rectangularly or rectilinearly, or by area; now in erect presentation and now horizontally.

By manipulation of these ratios he effected a gradation of masses sufficiently decisive but without suddenness, between the columns of the peristyle, those of the inner porticos, and those of the naos, enhancing the dignity of the superior without degrading the subordinate. The gradation of intervals is ordered with equal art and effectiveness.

The projection of the two broad steps and the offset below them is to the diameter of the column as 4 : 5—that is, it has the same proportion to the diameter as the diameter has to the inter-column, and is subordinated to the interval of the columns accordingly.

5 : 4 : : 6·245 (diam. of col.) : 4·990 (cf. 4·974 projection of steps).

The inter-column is then subordinated to the interval between peristyle column and cella wall by the ratio 7 : 8.

8 : 7 : : 8·945 : 7·825 (cf. measured inter-col. 7·829, &c.).

The breadth of the ambulatory on flank from edge of step to cella wall is in turn subordinated to like breadth on eastern front taken to the edge of pronaos step, in proportion of 7 : 8; and this breadth on the east front, from edge of top step to the step of the pronaos is subordinated to the dimension thence to naos wall in the ratio 5 : 6.

6 : 5 : 19·04 : : 15·867 (Cf. measured 15·878.)

In this manner we are conducted with a sense of constantly expanding room to the spacious interior of the naos.

The posticum is in general plan identical with the pronaos; but the slightly larger columns bring their intervals more near to equality with those of the peristyle, and the space from the cross wall to the top step is here equally divided by the step of the posticum.

Here we have still one more, and a very decisive, example of how the architect made it a principle to introduce an element of diversity between similars, and yet always in subjection to a new scheme of definite proportion.

I may say, in conclusion, that the confident assertion that we have here a true recovery of the principles, and it may be added the practice, of the Greek architecture, depends on the propriety of the selection of the members and dimensions which are brought into proportional relation, on the universality of the application of proportional regulation, on the simplicity of the select scale of proportions which is employed; and lastly, on the extraordinary accuracy with which the proportionate dimensions are put into execution.

Furthermore, it may be recommended to those who, after testing the calculations here provided, may be disposed to fancy that such appropriate and such precise proportions may be mere fortuitous coincidences, to examine for themselves the numerous Sicilian temples. Whatever may be the system on which the design of these was regulated, they exhibit but the very slightest and rarest approaches to such systematic proportions as we have traced in the Parthenon; yet these could not have been so abundant in the Athenian temples, and so all but entirely wanting in the Sicilian if it were in the nature of things for them to crop up, to develop themselves spontaneously.

W. WATKISS LLOYD.

NOTES.

THE report on the proceedings of the Board of Trade under section 24 of the Railway and Canal Traffic Act has just been published, and contains much that is interesting and instructive. The Commissioners express their belief that the classifications and schedules which they have prepared are such as will protect the interests both of the traders and the railway companies, and they give their reasons for adopting or rejecting the different courses which were suggested with regard to the various points upon which they had to decide. They found it absolutely impossible to ascertain the cost of carriage of the different classes of goods, and have had to fall back upon existing maximum rates as modified by the actual charges in force, for a basis upon which to form their own proposals. It will be a matter of surprise to many,—as it probably was to the Commissioners themselves,—to learn the extent to which "special" rates, as distinct from the ordinary class rates, have been granted. It is stated that on the Great Western Railway the proportion is half special and half class; on the Midland, 75 per cent. special and 25 per cent. class; on the Great Eastern, 55 per cent. special; on the London and North-Western, 73 per cent. special; on the North-Eastern, 61 per cent. special. The Commissioners remark that the Railway Companies have built up a traffic remunerative to themselves at rates, generally speaking, much lower than those at present authorised by Parliament, and, consequently, they came to the conclusion that "it is equitable to make a reduction in their present powers and to fix rates based, to a great extent, on existing rates, but with a reasonable margin of profit for possible changes of circumstances injuriously affecting the cost of or the returns from the carriage." The report, as a whole, is distinctly on the side of the traders, and, as the *Times* observes, the companies will find in the Board of Trade a new and formidable opponent should they persist in objecting to the proposed terms, and thus force the matter upon the attention of a Parliamentary Committee.

THE reports of the proceedings of the Trade Union Congress seem to become every year more and more melancholy reading; a mingling of absurd and Utopian aspirations for legislation in which everything shall be in favour of the working-man, coupled with displays of temper, personalities, and violent language which serve to indicate how far those who indulge in them would be fitted for the legislative responsibilities which they crave. The Parliamentary Committee, which consists of reasonable and logical men, is

attacked for not bringing in Bills for objects which every rational man knows they would not have a chance of obtaining a hearing for. One member of the Congress proposes that a general conference of labour associations should be called to consider the best method for payment of members of Parliament; another, amid "much uproar," moves that no labour candidate should receive support "unless he were in favour of the nationalisation of land, shipping, and railways!" And the same men who are crying out for these wild schemes are proposing to increase their own and the national prosperity by arbitrarily limiting the hours of productive labour!

IT appears that the unsatisfactory condition of affairs in the Tyne ship-building trade, to which we alluded on the 9th ult., still continues, and that nearly 1,000 men are now on strike. The dispute is one of unusual occurrence, as it is a struggle between two bodies of workmen, and one in which the employers occupy a passive and neutral position. Unfortunately for the latter, however, they are obliged to stand by and see orders going out of the district owing to the delay which the strike has occasioned in the completion of vessels. It will be remembered that the dispute turns upon the apportionment of the work which shipwrights (or carpenters) and ship-joiners are respectively entitled to do; and that Mr. Burt (who had been appointed arbitrator) gave an award which the joiners refuse to accept. Their action in thus repudiating the award and coming out on strike has naturally had the effect of alienating public sympathy, and it has, at the same time, probably opened the door to the shipwrights getting hold of work which is acknowledged to belong to the joiners' list. If this has occurred, however, it is clearly the strikers' own fault, and the Trades' Council of the District have just passed a formal resolution "withholding sympathy from any body of men who dissent from the award of a regularly-appointed umpire." It was the singularity of the dispute which led us to allude to it at the outset, but it appears to be as far off settlement as ever, and to have assumed a much more serious aspect than was anticipated. The latest advices from the district state that the Wear joiners have now decided to support their Tyneside fellows, and that it is not unlikely that the whole shipbuilding trade of the North may be brought to a standstill unless the other Unions affected speedily take the matter in hand and endeavour to bring about a settlement.

IN opening the new Museum of Science and Art and the National Library, Dublin, on the 29th ult., the Lord Lieutenant observed that he had noticed with pleasure what good use Irish workmen had made of the excellent Irish stone and marble of which that edifice is composed. "I sincerely trust," he said, "that the durability and beauty of these native products may be more largely recognised in the future, and, in consequence of increasing demands for them, important industries may be established on a sound footing in several parts of the country where hitherto there has been insufficiency of work to employ the population." This remark entirely coincides with the views that we have frequently expressed in these columns. No matter how poor Ireland may be in respect of other mineral wealth, there can be no question as to the richness of the country from a stone- and marble-producing point of view; yet its resources in these respects are comparatively neglected, owing chiefly to want of capital. Beautiful marbles, that could be very cheaply raised and worked, and immense tracts of granite (that of Wicklow and Wexford is the largest granite *massif* in the kingdom) lying both along the shore, within easy reach of carriage, and inland, are as yet untouched, save here and there by the opening of a solitary quarry for local purposes. The Carboniferous limestone of which the greater part of the country is composed yields durable building stone of many tints, and with a little expenditure of capital and proper introduction could, in many instances, be brought to successfully compete with other better-known kinds in the market. We feel sure that the Lord Lieutenant's hopes will some day be fully realised.

THE recent report of the Foreign Office on Emigration to the Argentine Republic is another of the very useful series which that Department now issues. It gives in a short space many useful hints to intending emigrants. Argentina is one of the finest and most promising countries in the world, but that is no reason why emigrants should rush there in an indiscriminate manner. But it is obvious that the greatest drawback to English emigrants is the desirability of knowing the Spanish language. In 1889, 5,967 English emigrants landed in Argentina, against 88,647 Italians, 71,151 Spanish, and 27,173 French. Thus, it is equally clear that a knowledge of Italian would also be desirable. But, all the same, there is a sufficient English element in the Republic to enable an Englishman of the right sort to make his way. "Navvies without families are sure to get immediate employment." This should be good news in this country, where railways have now been pretty well completed. "For surveyors and engineers, lucrative employment offers. . . . Architects, builders, and experienced contractors, with means, will find competition not as keen as in other parts." It is also stated that "all immigrants are landed, lodged for five days, and sent to any part of the Republic they may select free of expense." But, of course, they should have formed before-hand an idea of the part they desire to settle in. The English immigration clerk at Rosario also states that "there is always employment in the larger towns for the artisan handicraftsmen, more especially for carpenters, masons, shoemakers." This is exactly what one would expect to hear from a growing country. But the English mason has to compete with excellent workmen in the Italian emigrants. The same gentleman gives as the rate of pay for carpenters three to seven dollars per day, for painters two to four, for masons five to eight, and bricklayers two to four dollars. Account, of course, must be taken of the value of paper money, but it does not affect men much who are not remitting money home. The fine climate is a great advantage, especially in the case of masons and bricklayers, who are thus pretty sure of continuous employment.

A WRITER in the *Times* last week drew attention to the fact that the Western Australian strike was that of workmen earning very high wages, and he draws the moral that poverty is not necessarily a motive-cause of strikes. The letter was well-timed, but it only expresses what most thinking men have already perceived, that once trades unions became very powerful, strikes would occur, not in order to obtain wages upon which men could live reasonably well, but upon which they would be able to obtain more than the mere necessaries of life. It is contrary to all the teachings of history, and to all the experience of mankind, that power in the hands of the masses should be used with moderation when distinct personal advantage can be gained by its arbitrary employment. It is perfectly obvious that the labour-question has yet to undergo much greater developments, and he would be a bold man who would venture to prognosticate the course of the struggle between capital and labour. The subject is one which cannot be too carefully and seriously studied, more especially as everything seems to show that the struggle must yet become more severe. There may yet come a time when communities will not only have to bear the burden of taxation, but also of high charges caused by the arbitrary power of organised labour.

A RECENT addition to the Illustrated Biographies of Great Artists is the two small volumes containing the lives of Millet, Rousseau, Diaz, Corot, Daubigny, and Dupré. These artists are classed together as "The Painters of Barbizon," or, as appears at the head of each page, "The Barbizon School." Another work on these same painters has also appeared this year, by Mr. D. C. Thomson, "The Barbizon School of Painting." This loose way of grouping these painters as one school is very characteristic of a good deal of the art criticism of the present day, which uses inaccurate phrases which sound well. A "school" of painters is one which is characterised by certain marked similarities; and by classing certain artists together as a particular "school" the student at once is able to recall at any moment the cardinal features of their work. But the painters who compose the so-called "school" of Barbizon have no common characteristics. They passed part of their lives in the same picturesque village, and that is all. Rousseau, for example, was a great landscape-painter, with nothing akin in his work to the peculiar treatment of Millet's pictures. It would be just as sensible to class the artists who live near each other in a particular part of Kensington as the "Campden Hill School." We call attention to this loose way of writing of these artists, because artistic criticism, if it is to be of any value at all, should be thoroughly accurate. It is perhaps, indeed, using somewhat inaccurate phraseology ourselves to call these popular biographies art criticisms, for they are not real criticisms in any sense of the word. They are handbooks which may well be used as aids to memory, but they are very valueless for any higher purpose.

A WELL-KNOWN bookseller in Edinburgh, Mr. William Finlay Watson, who died in 1881, by his will bequeathed to the National Gallery of Scotland his collection of paintings, drawings, autographs, manuscripts, missals, written and printed books, literary papers, curiosities, &c. Under the will the sister of the deceased, Miss Helen Aberdein Watson, was to have the use of the collection during her lifetime, and after her decease, the Trustees of the Gallery were to select from it whatever they thought worthy of a place in the National collection. Miss Watson died a few days ago, and the collection is now at the disposal of the Trustees of the Gallery. The collection contains numerous examples of rare and valuable etchings and engravings, several of which Mr. Ruskin declared to be invaluable. Amongst other works the collection contains Wilkie's original sketch for "The Penny Wedding," two early works of Turner, as also paintings by Holbein, Vandyke, Hogarth, David Roberts, Alexander Naysmith, &c. Several of these works are portraits which will be valuable acquisitions to the Scottish National Portrait Gallery. Amongst them are portraits of Queen Mary, Darnley, Edmund Spencer, Shakespeare, George Buchanan, Charles I., Christopher Columbus, the Admirable Crichton, Henry Mackenzie, Smollet, James Watt, and others. Miss Watson was herself an enthusiastic collector of antique curiosities, her proclivity taking the appropriate lady-like direction of old china and drapery. These she has left to the Scottish Museum of Science and Art. They embrace a dressing gown of Napoleon I., the tea-tray, cup and saucer from which Robert Burns drank tea with "Clarinda," &c.

IN the course of operations upon St. Giles' Cathedral, Edinburgh, consequent upon the formation of the Chambers Memorial Chapel, the workmen came upon the arm bone of the patron saint, St. Giles. This relic was, it appears, originally encased in a valuable casket enriched with jewels. At the Reformation, the Magistrates sold the casket and appropriated the proceeds, but, with characteristic Scottish caution, hid the relic itself in anticipation of the possibility of a future rise in the price of relics, then at a low ebb. If now offered for sale, it may yet realise a considerable sum, which might appropriately be applied to the decoration of the

fabric. It is alleged by some that the Kirk is rapidly tending towards Rome, but the time is hardly ripe for reinstating the relic in its original place, although the effigy of the Saint has been recently installed over the new and richly-decorated west doorway, a cause of much scandal to rigidly orthodox Presbyterians.

ONE of the provisions in the new Allotments Act is that the parish schoolroom shall be used for meetings in connexion with the allotment of a village. It is obvious that this provision is another instance of the necessity of village halls. The village school is by no means in many instances the best place for public meetings, especially where the best kind of school furniture exists. School furniture must from time to time be improved; the ordinary bench and desk is not always the best form of article. Every meeting means some disarrangement of school furniture. Often also meetings disarrange night classes, &c., which are held in the school-room. The fact is that a village hall should be found in every village of any size; it can always be used as a reading-room, and its very existence would enable many meetings and gatherings to take place which are now impossible.

AN Oxford correspondent writes: "The *Durham County Advertiser* of the 29th, in referring to Mr. Claude de Neuville's drawing of an interesting old building at Oxford, known as St. Giles's Old Parsonage, states that it was 'purchased by the Executors of William of Durham, in 1219.' Dr. James Ingram, in his 'Memorials of Oxford,' informs us that it was originally a hospital, said to have been founded by Ailwin Godegose. It is described in the MSS. of University College as a cottage, which led Wood to think that it had been alienated from the use of a hospital as early as 1219, when it was, among other things, purchased as above-mentioned. But we find it denominated 'Le Spitel' nearly 200 years afterwards,—namely, in the will of John Ocle (Oakley), of Oxford, dated 1390, in which he leaves a small legacy to each poor person then in the hospital."

ANOTHER important competition for a monument to the deceased Emperor William I. has been decided, this time for the Province of Westphalia, the site chosen being on the well-known Wittekinds-mount of the Porta Westphalica (see page 110, *ante*), and again we hear that Herr Bruno Schmitz has gained the first prize. It is certainly remarkable that so young an artist should be successful in all these monument competitions he takes part in, and whatever style they are designed in!

THE old silk-mill at Derby, which fell in a few days ago, was established on an island in the Derwent, by John Lombe, in 1719. When Crotchet's attempts to introduce the art of silk-throwing into this country had failed, Lombe went to Italy, where he is said, at the risk of his life, to have obtained access to some manufactories by bribing the workmen, and to have committed to paper by stealth the results of his observations. However, he takes out a patent, on September 9, 1718, for "three engines," whereof he says:—

"I have at very great expence and hazards found out, discovered, and brought into this kingdom the art of makeing the three capitall engines or sotts of working tools called in Italy Il inganatore or incaruator—fillato, and iltort, . . . to work their fine raw silk into orgazine [*sic*], which are now used in Bolognia, Piedmont, and some other foreigne parts."

His specification contains, in Italian, some technical terms, in respect of which he writes, "there are not proper English names for things that have never been knowne or used here": and water was to supply the power. Lombe leased the island from the Corporation, and there built his mill,—five stories high and 200 yards in length,—which was considered a wonder of the age. He brought over two Italian workmen, one of whom, according to William Hutton, who was employed in Lombe's mill in 1730, turned traitor, and poisoned his master at the instigation of a woman who had been sent from Italy for that purpose. Lombe died, after a long illness, about seven years after opening the mill, which his relative, Sir Thomas Lombe, carried on. The building has since been used as a steam laundry; but of late years has been in a ruinous state.

THE improvement of that branch of the River Pleisse which passes through Leipsic has been taken in hand, and for this purpose the waters have had to be turned off on a considerable length of the course, so that the rays of the August sun fall on the black mud at the bottom. The work itself (alterations on the embankments, &c.) is being done with all possible speed, and we also note that the upper layer of the filth is gradually being cleared away; but it seems most discreditable that the municipal authorities of the city should sanction the carrying-out of a work, dangerous at any time in a sanitary point of view, in the hottest month of the year. Even if the official representatives are not "in town" at present, and perhaps also not the members of the "upper thousand," the bulk of the inhabitants are in the city, the schools having had their holidays in July; and as the stench in the vicinity of the waterway is excessive, and numerous well-inhabited mansions overlook the course, it is indeed a wonder that disease has not yet broken out. Looking at the death-rate of the town, we find the percentage nearly twice as large as the London one; in fact, statistics show that this Saxon city ranks among the unhealthiest in the civilised world; a fact not to be wondered at, considering the bad drainage and wretched state of sanitary arrangements in general.

LAST year Dr. R. J. Petri undertook a series of experiments at the Charlottenburg Polytechnic, in order to test the efficacy of textile air-filters for excluding micro-organisms. A short account of these experiments was published in the "Proceedings of the Institution of Civil Engineers." A measured volume of air containing germs was passed through a filtering-cloth, and the result was ascertained by cultivation experiments on gelatine. The cloth used was a cotton fabric especially made for the purpose, and contained a weft of eighteen to twenty threads, and a warp of nineteen threads to the centimètre. The volume of the air passed through was 161·75 cubic mètres per square mètre of filtering surface. Dr. Petri found that this cloth failed to keep back the germs, as in one cubic mètre of filtered air there were 2,900 bacteria and 13,500 spores of fungi. Some experiments were made with another cloth of closer fabric, and which had been used as an air filter for some time. This gave far better results, although there were 510 germs of bacteria and 320 fungi spores in a cubic mètre of air. It was found that a cloth which had been used for seventeen months had retained approximately 6,780,000 bacteria and 8,570,000 fungi spores per square mètre of surface. These results were calculated to upset the belief of those who were trusting to the efficacy of air filters of this nature, and in a recent number of the German publication *Zeitschrift für Hygiene* (Vol vii., p. 379), Dr. Karl Möller, who is a member of a firm engaged in the production of air filters, criticises Dr. Petri's experiments, the results of which he considers not to be reliable. There are, he says, two kinds of air filters, "germ-proof" and "dust-proof." The former consists mainly of ten layers of a thick, closely-woven, and very rough material. The layers are arranged in a series of bags or pockets, the surfaces of which are placed at an angle to the direction of the air-current, the angle varying between three and five degrees. This disposition of the cloth, it is claimed, has a very great influence on the efficacy of the filter. In the dust-proof filters only one thickness of cloth is used. Dr. Möller complains that Dr. Petri did not conduct his experiments under conditions suitable to testing the filter. The latter caused the current of air to pass at right-angles to the surface of the cloth, which, further, was strained by the passage of large volumes of air at an excessive velocity. Moreover, the cloth was not sterilised to begin with. On the whole it would seem that further experiments are required before we can say definitely that a "germ-proof" filter has not been made, although it seems too much to expect that, by any arrangement of layers of cloth, micro-organisms can be altogether arrested. Upon the value of "dust-proof" air filters there is, or rather should be, no need to enlarge; their advantages are plainly manifest and consistently neglected.

ELMSTONE COURT, together with the ancient manor of Elmstone, in the lathe of St. Augustine, Kent, which will be offered for sale shortly, is identical with the Ælvetone of the Conqueror's survey, being then held of the Abbot of St. Augustine's, Canterbury, by one Ansfrid. It afterwards passed to the Leyborne family: in 53 Hen. III. Roger de Leyborne renders homage for Eylmerstone to Roger de Cycestre, Abbot of St. Augustine's, before many witnesses. Dugdale says that for failure of an inheritor the manor escheated to the Crown on the death, 41 Edw. III., of Juliana, daughter of Thomas de Leyborne, popularly styled the "Infanta of Kent" by reason of her great possessions. King Richard II. settled it upon the Priory of Chiltern Langley, Hertfordshire, which retained it until the Dissolution. Henry VIII. bestowed it *in capite*, at one-twentieth part of a knight's fee, and then valued at 15*l.* per annum, upon his Attorney-General, Walter Hendley. In Hasted's "Kent" (1790) the court-lodge is described as standing "near the south side of the parish, having round it a moat which is supplied by a spring rising just above it, the water from which runs . . . . towards the river" [Stour]. A part of the old manor-house, or court-lodge, is incorporated in the present dwelling.

IN reference to the durability of iron bridges, some interesting tests have been made upon a link taken from the Kieff suspension bridge by order of the Russian Public Works Department, Professor Belelubsky carrying out the operations. This bridge was built over forty years ago by Vignolles, who fortunately made provision for a number of spare links being left. This has enabled the tests in question to be made. These links are 12 in. by 1 in., and 12 ft. long. One of the links was taken out of the bridge, being replaced by one of the spare ones. Four test pieces, 1 in. by 1½ in. by 8 in., were cut in the direction of the length from the used link, and the same from another spare link. One 4-in. specimen was also taken from each of the two links in a transverse direction. The tensile strength of the 8-in. test-piece from the old link was 21·8 tons per square inch, the elastic limit 11·1 tons per square inch, the elongation 14·05 per cent., and the contraction 17·35 per cent. of the area. The corresponding figures for the new link specimen were:—Tensile strength 22·2 tons, elastic limit 11·93 tons, elongation 13·42 per cent., and contraction 18·75 per cent. In the specimens taken across the grain, the tensile strength of the link taken from the bridge was 14·9 tons, elongation 2·1 per cent., and contraction 1·6 per cent. The corresponding figures in the new, or rather unused link, were: Tensile strength, 17·32 tons; elongation, 6·0 per cent.; contraction, 6·8 per cent. The tests are satisfactory, as the variation in the figures given in the tests is not greater than might occur between different samples of wrought iron. The superiority of the unused link shown in the transverse test may appear marked to those who have grown accustomed to the more homogeneous metal of which we now more frequently have records, but those who remember how extremely various were the

results obtained by tests of wrought iron, when made across the direction of rolling, will not place too much importance in these figures. It might have been wished that considerable tests could be made on the material of more rigid structures than suspension bridges, but this, of course, is a far more difficult matter. It is also to be hoped that in the fulness of time experiments will be made with steel bridges, especially the high carbon steels now becoming popular, which may prove a very different material for withstanding the effects of vibration to the tougher rolled iron, with its interposed layers of slag.

WE read in an evening contemporary that the Peabody Trustees have arranged with Lady Somers, as ground-landlord, and the St. Pancras Vestry, for the erection of a large block of workmen's dwellings upon the site of the Polygon, in that parish. The Polygon stands within Clarendon-square, in Somers-town, a district where, as also in the neighbouring Agar-town, of late years considerable clearance has been made for the extended premises and works of the Midland Railway. Clarendon-square has deteriorated very much since the days when William Godwin occupied a house in the Polygon, after his marriage with Mary Wollstonecraft. The latter died here in 1797, and was buried in the neighbouring burial-ground of (old) St. Pancras.

THE correspondence about "sky-signs" which has been going on in the *Times* for the last few days has more of point and reason than some of the letter-writing about odd-and-ends which is encouraged in the daily papers at this season. The rage for advertising in the present day is constantly leading to new methods of display, and it is in the nature of things that each new system that is adopted should be more obtrusive and more self-asserting than all previous ones, since that is really the main motive for adopting it. In these days nothing is sacred from the enterprising advertiser, and we have no doubt that it is only the risk and cost of the erection that prevents us from seeing Pears' Soap advertised along the top of the range of the Alps, in letters large enough for half Europe to read. The town sky-sign is a much more objectionable because much more prominent form of advertisement than the wall-placard; and the only check to its multiplication *ad infinitum* seems to lie in the fact that too great a number of these signs would be in each other's way and defeat their own object. There is room, however, for quite enough of them to form a most serious disfigurement to a city, as well as a new source of danger in high winds and in fires; and it is therefore satisfactory to observe that the firm whose sign has been most complained of in the correspondence referred to have determined on its removal. Messrs. Hudson do not admit the truth of all that has been said against their sign, but they admit that if everyone else in Ludgate-hill put up the same kind of erection the result would be most objectionable, and they therefore intend to remove theirs and avoid setting a bad example. In adopting this sensible course Messrs. Hudson are probably doing themselves much more benefit than they would have gained from the continuance of the obnoxious sign, and they are perhaps also unintentionally heading a movement against this form of advertisement, for it is not unlikely that others will seek, by the removal of similar signs, to gain the same commendation for public spirit which Messrs. Hudson have justly received.

"MASONIC REPRINTS."

THE Lodge Quatuor Coronati, No. 2,076, London, has continued its archæological labours in the interest of the history of Freemasonry since the review of Vol. I. of the Reprints, which was inserted in the *Builder* for Sept. 28, 1889, p. 218–9. That Vol. I included the reproduction of the great "Masonic Poem," existing in MS., the date of "about 1390" being now ascribed to it (first half of fifteenth century formerly). This was accompanied by a very able "Commentary." There are now before me Vols. II. and VII., both bearing the date of 1890.* The latter may be at once described as containing a lithographed facsimile of the 232 pages of the quarto volume entitled "The New Book of Constitutions of the Antient and Honourable Fraternity of Free and Accepted Masons," by James Anderson, D.D., London, 1738, in the vulgar year of Masonry, 5738. An interesting "Introduction" by Mr. W. J. Hughan gives an account of this compilation, which first appeared in 1723; and writes of it, "But whatever may be its merits or demerits, according as we look at the volume leniently or critically, the fact remains that to it, and to it alone, we are indebted for a history of the Grand Lodge of England, from its inauguration in 1717 to 1723, when the official records begin, and from that period for an able extract of the Proceedings; hence the work has been described as the "basis of Masonic History," and "the Father of English Masonic History." This volume being now scarce, it has been selected as one of the series of Reprints, and could not have been more faithfully represented.

Volume II. is of a different character. It contains in Part I. a facsimile and transcript of a manuscript in the British Museum, considered to be the second oldest of the Constitutions or Old Charges of Masonry, and from its having been issued in 1861 in a fairly good manner by the late Matthew Cooke, it is styled the "Matthew Cooke Manuscript" to distinguish it from the earlier one (noticed in the *Builder* of 1889 as above) now called the "Regius Manuscript." The date of "not later than the first half of the fifteenth century" has been given to it by Mr. E. A. Bond, of the British Museum, while by others the latter part of fifteenth century. Part II. is a facsimile and transcript of a similar "Constitution" in manuscript in the Lansdowne collection in the Museum, of a date of "circa 1560" or about "1600." Part III. is a facsimile and transcript of another such manuscript in the Harleian collection to which the date of "beginning of seventeenth century" has been assigned by Mr. Bond, while "after 1721" is considered right from its containing certain "New Articles" (which first appeared in print in 1722), but the Harleian MS., 1941, which also has them is ascribed to "cir. 1670."

If of the Regius MS. no history is attached, there is some to this one of Mr. Cooke, for there is little doubt that it was known to Dr. Anderson before 1723; and the "Woodford MS." is an almost verbatim copy of it, made in 1728 by Wm. Reid, Secretary to the Grand Lodge, for Wm. Cowper, "Clerk of the Parliament," who himself had been Grand Secretary. While a transcript is here given in Volume II., there is at the same time a modern reading printed for the benefit of the unlearned in old English. The Secretary of the Quatuor Coronati Lodge, Mr. G. W. Speth, commenting upon this manuscript,—the Cooke MS.—considers that it is probably not more than fifty or sixty years earlier than the time of its author; but I consider that it is evidently the book in use among the Masons of some particular part of the kingdom, when and where our author was associating with them. And further than this, it is the purest, least altered copy of these Constitutions that has at present come down to us, and therefore the most valuable, far exceeding in intrinsic value the metrical version presented to us in the Regius MS. It consists of a commentary preceding a version of the "Old Charges"; the subsequent "Constitutions" make this commentary a part of the book itself. He considers the rhymed version, the Regius MS., is composed from a later original that the prose version or Cooke MS.

The Lansdowne MS. is written on one side only of four sheets of stout paper, measuring about 18½ in. by 13 in.; while the Harleian MS. is of twenty pages, measuring 7½ in. by 5¼ in., the writing leaving very small margins. The chief interest attached to this last is that it contains "The New Articles," consisting of clauses determining who may be elected a Free Mason, "the said society, company, and fraternity of Free Masons shalbee regulated and governed by one master and assembly and wardens—at every yearely generall assembly; and noe pson shalbee accepted a Free Mason or know the secrets of the sayd society untill hee hath first taken the oath of secreecy hereafter following."

It will, therefore, be seen that there are in this Volume II. three versions of the "Old Charges," of various dates and of various merits. No one can doubt that each was written for the use of a Lodge of Masons; the "when" is doubtful, and the "where" quite unknown. The earlier MSS. were also, no doubt, used in the operative Lodges at the admission of an apprentice. This Cooke MS. contains the line (621) that Athelstan's son "lerned practyke of that sciens to his speculatyf. For of speculatyf he was a master." If the MS. be of the date given here to it, namely, say about 1430, or even of the end of the fifteenth century, it shows, I consider, a *very early* use of the term, for can the word "speculative" be found used earlier than 1530? The word occurs neither in the Lansdowne nor Harleian reprints; nor in the 1738 reprint of the old Constitutions now presented, nor in any other copy to which I have had access. This line 621 has been often quoted, but perhaps its absence from so many copies may not heretofore have been observed. Have the learned commentators on these manuscripts considered the point, especially in their chronology and classification of them? It is stated that the fac-similes of these two interesting manuscripts are the work of Mr. F. Compton Price, and that they will bear the most rigorous inspection and comparison with the originals. I can honestly add my testimony to the apparent great care bestowed upon them, and the beauty of their execution. WYATT PAPWORTH.

*"Quatuor Coronatorum Antigraphia." Masonic Reprints of the Lodge Quatuor Coronati, No. 2,076, London. Edited by G. W. Speth, P.M., Secretary. Volumes II. and VII. Margate: Printed at *Keble's Gazette* office. 1890.]

THE TRADE UNION CONGRESS.

THE annual Congress of Trade Unionists is being held this week at Liverpool, and, according to all accounts, is being much more largely attended than usual.

The opening proceedings took place on Monday, in Hope Hall, when about 450 delegates were present. Mr. J. Swift, of Manchester, took the chair in the first instance, and in his opening remarks referred to the great changes which had been made in the status of trade-unions and unionists since the Congress last met in Liverpool (in 1875).

On the motion of Mr. Peters, President of the Liverpool Trades Council, Mr. William Matkin, general secretary of the Carpenters and Joiners' Society, was unanimously elected President of the Congress. Having taken the chair, he called upon Mr. Broadhurst, M.P., to read the Report of the Parliamentary Committee, from which the following passages are extracted:—

Employers' Liability.

"The last Congress was looking forward with considerable anxiety to the action the Government would take with respect to the above question during the session that has just expired. Although the Government promised to deal at an early period with the matter, they did not introduce their Bill until some time after the commencement of the session. Immediately the Bill was made public, your committee held a full meeting, and unanimously instructed the secretary to move that the Bill be read a second time that day six months whenever the second reading stage should be reached. This decision, which was not arrived at until after a long and careful examination of the terms of the measure, was based upon the following objections,—namely, that while the Bill was in many respects an improvement on that of 1888, inasmuch as it abolished a great many complicated parts of what was then known as clause 3, yet it retained the principle of contracting out of the Act, maintained the doctrine of common employment, and limited our existing common law rights; while the clause relating to seamen was declared by the secretary of the Seamen's and Firemen's Union to be useless and inoperative except to about 5 per cent. of the men engaged in the mercantile marine. Taking all these circumstances into consideration, your committee were of opinion that it was better to oppose the progress of the measure, and to await the advent of a new Parliament, when the ballot-box will clear men's minds with regard to our just requirements; and a new Government, of whatever party it might consist, will introduce a broad measure, giving to the working-classes the same law as is at present in force for the benefit of the general public. For more than this we have never asked, and with less we shall never be contented."

Factory Act Amendment Bill.

"Your committee, in conjunction with the committee of the textile factory workers, in the early part of the session, invited a number of members of Parliament connected with the textile and other districts most directly affected by the Bill, to meet them in conference at the Westminster Palace Hotel, London. Some forty members attended the meeting. Sir Henry James presided. Mr. Birtwistle explained the objects of the proposed changes in the law, and at the close of the conference it was resolved:—'That the members of Parliament representing textile and other districts most directly affected by the proposals, should form a committee for the purpose of conferring with the representatives of the employers and employed, and discussing with them the provisions of the draft Bill, with the object of coming to some common understanding.' This committee was appointed, and consisted of nineteen members, with Sir Henry James as chairman, and Mr. R. G. C. Mowbray, Mr. H. Byron Reed, and Mr. George Howell as joint secretaries. During the Parliamentary session several conferences took place between this committee and the employers and operatives' representatives, but up to the present they have not been able to come to an understanding upon all points, as the employers, while agreeing to certain modifications of the present law, which are very desirable, and will be of considerable utility, strongly object to some of the main features of the Bill, and we are afraid that no satisfactory agreement can be arrived at with the employers, and that there is no other course left open to us but to introduce the bill drafted on our own lines."

Enginemen's Certificates Bill.

"After many conferences, and the expenditure of much labour on the part of your chairman, and the representatives of other societies interested in this question, the Bill has been entirely re-drafted. It was again placed in charge of Mr. Fenwick, M.P., who, from causes quite beyond his control, was unable to secure a debate, or make any progress with it during the session."

The Labour Conference at Berlin.

"One of the most notable events of the year was the conference that was held at Berlin, at the invitation of the Emperor of Germany, to consider the question of international labour legislation. We are not inclined to attach too much importance to this gathering, but it is undoubtedly a distinctive step forward, and it has enabled European Governments to become acquainted with the comparatively advanced position which labour occupies in this country. As soon as it was definitely announced that the conference would be held, your Secretary had interviews with members of the Government, and suggested that direct representatives of labour should be sent to attend it. He submitted a number of names of competent workmen for this purpose, from which the Government ultimately selected three—Mr. Burnett, Mr. Burt, and Mr. Birtwistle. We believe that some fruitful results of the conference are to be seen in recent legislation in Germany, and in the increased interest displayed by European nations in the labour question and the condition of the workers."

The Quarries Regulation Bill.

"The Quarries Regulation Bill was re-introduced by your secretary, but through lack of opportunity, coupled with the determined opposition of the Government, no progress was made with it. The measure is a most desirable one, and deserved a better fate."

Picketing.

"For some time past the Congress and the committee have been repeatedly appealed to with regard to the law on this subject. The law is, however, perfectly clear, and cannot be mistaken in the permission it gives to peaceful picketing. If those engaged in trade disputes necessitating this means of protection would obtain the information which they could easily get before undertaking the work, there is no reason why they might not conduct picketing successfully and without any liability to prosecution. This, indeed, has always been our contention. In a recent case at Bristol, arising out of the bakers' strike, some men were committed for trial, and the Bristol Trades Council, after consultation with us and adopting our advice with regard to the defence of the men, had the satisfaction of hearing a judgment given by Mr. Justice Cave, at the Bristol Spring Assizes, in which he clearly upheld the rights of workmen in this matter. The essential parts of the judgment were reprinted and sent out to the trades in a circular we issued last May."

General Remarks.

"The past year has been one of remarkable activity in the labour world. There are many and various reasons for this increased life. In the first place, combination is perfectly free and recognised by law in the Trade Union Acts, and the law of contract, if not perfect, at any rate leaves little to be desired. Increased interest is taken in workmen's movements by the press, and enormous prominence is now given to labour agitation by newspapers which, in the days which have scarcely passed, had nothing but sneers and misrepresentation when they did not utterly ignore the efforts of the workers to better their condition."

The balance-sheet of the Parliamentary Committee showed that the income for the past year amounted to 1,121*l.*, comprised of subscriptions, 795*l.*; sale of Congress reports, 139*l.*; delegates' fees to Congress, 175*l.*; and that, after meeting the various items of expenditure, there was a balance in the treasurer's hands of 371*l.*

The consideration of the report was adjourned until after the delivery of the President's address.

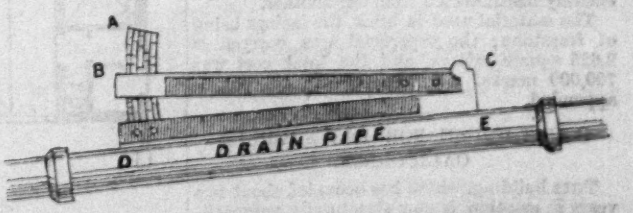
The Organisation of Labour.

On Tuesday, Mr. Matkin delivered his Presidential address. In the course of it he is reported by the *Liverpool Post* to have said:—"Those seers of the press who assert that the present labour revival is spasmodic and consequent on good trade have evidently lost sight of certain material facts. There have been periods of commercial activity before, and necessarily with them increased labour organisation. But in no case has there been the slightest approach to the remarkable developments we have so recently witnessed. It is, therefore, necessary to go deeper than to the state of commerce to ascertain the cause. It cannot, of course, be disputed that the Anglo-Saxon is pre-eminently endowed with great organising faculties. Our colonial expansion, our system of government, our successful local representative bodies, our ancient guilds, and our host of voluntary successful enterprises, all bear testimony to this. Trades unionism is, in fact, an offspring of this spirit. It is practically an hereditary quality. Now, what more natural than when the working classes were educated, came into possession of a cheap literature, and had the advantage of a free Press, these organising qualities should be developed, and that trade combinations should spread rapidly? The present labour revival is, in fact, a distinct step in natural progress, and undoubtedly is the forerunner of a national organisation of industry. There is, of course, no *Ultima Thule* with labour; the goal of one generation must be the starting-point of another; and thus, so long as the working classes are kept in uncertainty as to their present subsistence and their future security, so long will they avail themselves of every opportunity to strengthen their position, and use the powers of State for the benefit of the labouring multitude. While they may not exactly reverse the rule of the past, wherein the many were sacrificed to the few, they will in future demand that the powers of Government shall be exercised to make the condition of the masses much more endurable than it is at present. Naturally, its first demand in this direction will be for an eight hours Bill. The time has undoubtedly arrived when energetic steps should be taken to secure an eight hours' day; the subject has been vigorously discussed by preceding congresses; the trades sincerely desire it; the Press and the public are aroused to its importance; foreign workmen are determined to secure it, and their various Governments are showing greater readiness to concede it. The bogie of foreign competition will, in fact, shortly be laid to rest. This is not a time to hesitate or halt by the way. The working classes must lead the van; and it is, in fact, to this country that the Continental States look for the initiative in this reform, as was strongly evidenced at the congress recently held at Berlin, under the auspices of the German Emperor. Although naturally reluctant to discuss a subject upon which there is so keen a division of opinion, I should be false to my duty and to the important results which the people expect from the congress, if I did not pointedly express an opinion upon the eight hours' question. In doing so, may I draw your attention to the significant fact that although a substantial trade revival has existed for nearly two years during which the trade union development has been remarkable, still few general and concerted efforts have been made to establish the eight hours day by means of voluntary efforts. I am not complaining of this; on the contrary, I believe the unions have acted up to the measure of their strength and of their opportunities. If therefore they have, through a variety of causes, been unable to begin the struggle for this inestimable boon, it seems to me that an additional argument has been supplied for legislation. If the eight hours day is not secured when trade is good and when the unions are necessarily at their strongest, it is obviously impossible for them to obtain it when commercial depression sets in and the unemployed clamour at the gates of capital. I have no fear that an eight hours Bill will injure British trade, sap the independence of the workmen, or practically destroy our unions. On the contrary, let me draw your attention to the significant fact that the application of the Factory Acts to the textile trades of this country, and the consequent legal regulation of the hours of labour, has not ruined the cotton trade, and has not to any marked degree played into the hands of the foreigner. Similarly, in the manufacture of machinery, a developing trade demonstrates that the nine hours system has not worked the havoc on our commerce that fearsome prophets foretold. Indeed, many facts justify the conclusion that reduced hours, by developing the physical and mental powers of the individual, really leads to cheaper production."

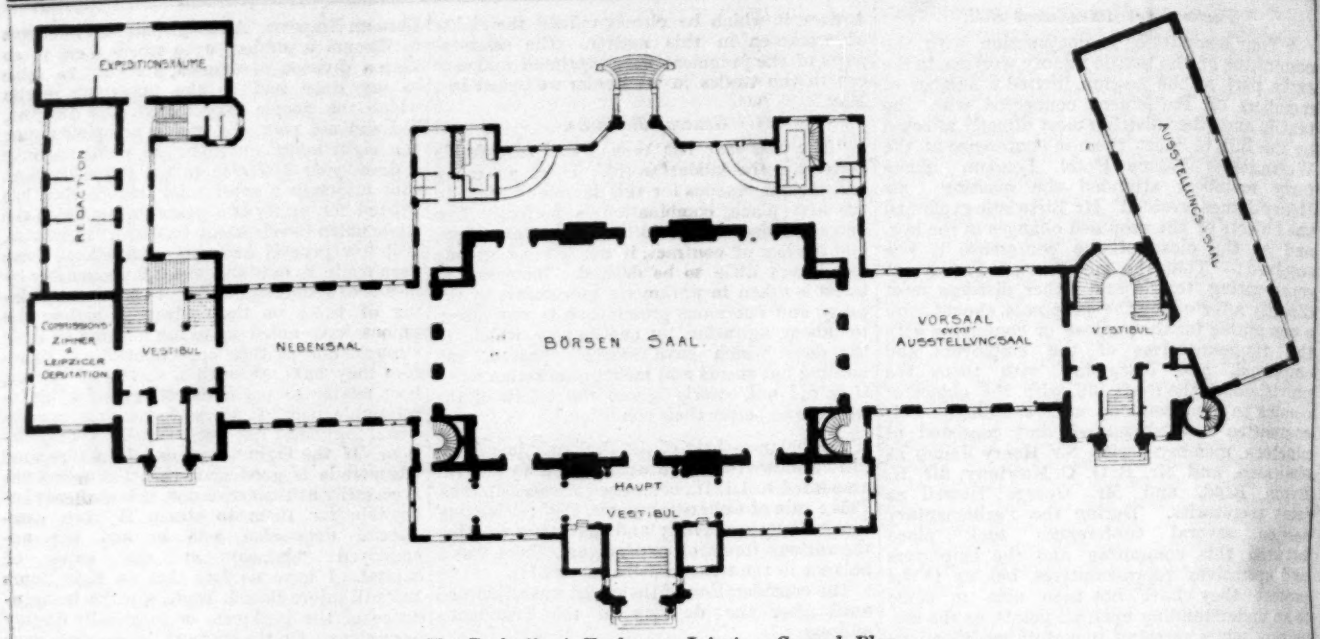
We will next week briefly record some of the further proceedings of the Congress.

MOSS FLOWER'S ADJUSTABLE GRADIENT INDICATOR.

THIS handy instrument, now on view at Stall 34 in the Brighton Health Exhibition, has been devised for laying down gradients and ascertaining the rate of inclination of existing gradients, and will be of great use to architects, surveyors, civil and sanitary engineers, builders, sanitary inspectors, clerks of works, and others. By its use, drains can be accurately laid to any required fall, as will be seen by the accompanying illustration and description of the instrument:—A is a brass plate accurately graduated to the most useful rates of inclination, including 1 in 6, 1 in 7, 1 in 8, 1 in 9, 1 in 10, 1 in 12, 1 in 15, 1 in 18, 1 in 20, 1 in 24, 1 in 30, 1 in 36, 1 in 42, 1 in 48, 1 in 50, 1 in 54, 1 in 60, 1 in 70, 1 in 80, 1 in 90, 1 in 100, 1 in 150, and 1 in 200. B. C. is the limb carrying the spirit-tube, and works about the pivot at C. Suppose the gradient required for drain is 1 in 30, the limb B. C. is raised to the line marked 1 in 30 on graduated plate A, and is held firmly in this position by a clamping-screw. The level is then ready for use, and the accuracy of the gradient can readily be determined by applying the bed D. E. to the uppermost surface of pipe, or straight-edge, and if the gradient is as required, the bubble will float midway in the spirit-tube contained in the limb B. C. Its adaptability for ascertaining the rates of inclination of existing gradients will afford a ready means of showing at once whether existing drains have a sufficient fall at any particular point, by unearthing the same and applying the bed of the level to the drain-pipe, raising the limb B. C. until the bubble floats midway in the spirit-tube, clamping up, and reading the index.



The instrument is inexpensive and simple in construction, and is made of boxwood, plated



The Booksellers' Exchange, Leipsic: Ground Plan.

with brass. It is only 9 in. in length, the accompanying diagram showing its application not being drawn to scale.

Illustrations.

THE NEW BOOKSELLERS' EXCHANGE, LEIPSIC.

THE new Booksellers' Exchange at Leipsic, which has been designed by and erected under the superintendence of the Berlin architects, Messrs. Kayser & Von Groszheim, shows elevations in a style similar to that used on the German gable houses of the sixteenth and seventeenth century.

The building, which not only contains the Exchange-hall proper, with its vestibule and offices, but also two large halls to be used for special exhibitions, and on the first floor a library and rooms for the collections of the Graphic Museum, is considered to be exceedingly well planned, and has the advantage of being arranged so that it can all be used as an entire whole for festivities or receptions; or it can be used in separate blocks, attainable from without by means of separate entrances, and entirely disconnected from one another.

The material used is brick, the facings being of freestone; the superficial area covered is 2,625 square mèters, and the total cost was 700,000 marks. A plan of the building is appended.

COURT-HOUSE FOR LOS ANGELES, CALIFORNIA.

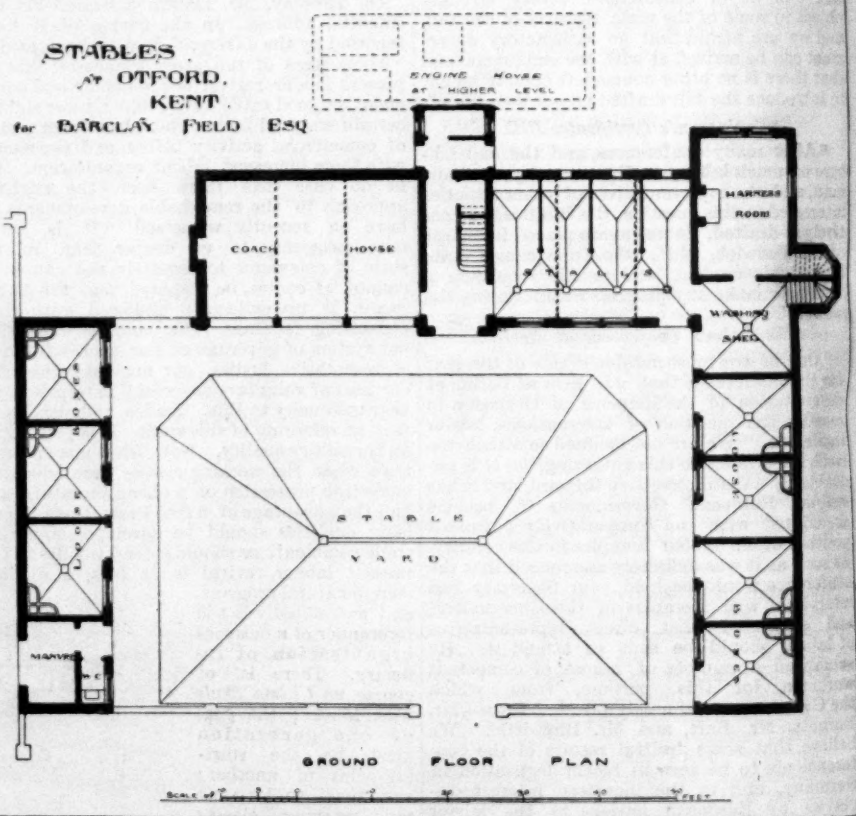
THIS building, which has occupied about two years in erection, is now structurally approaching completion.

It occupies a commanding site on an elevated plot of land, bounded by Fort, Temple, and Buena-Vista streets on three sides, and by the County Police-station on the fourth.

The building is traversed by a spacious corridor the whole length, on three floors, communicating with principal and two secondary flights of stairs, and giving access to the six court-rooms, judges'-chambers, witnesses'-rooms, offices for the various civic functionaries, and large apsidal-ended chamber for board of supervisors, together with library, strong-rooms, and well-arranged toilet requisites for each department, janitors and engine-rooms, &c.

The structure is erected upon concrete foundation; the basement is of granite, the upper external walls of red and buff Arizona sandstone, internal walls of brick, and partitions and floors of corridors, court-rooms, &c., of hollow firebrick and concrete, supported on rolled iron joists; the roofs are slated, and have buff terra-cotta ridge cresting and finials, &c., and the tower and turrets are covered with copper.

The heating is by means of hot water circulation; the inlet ventilation is supplied by "Tobin tubes," and for lighting both gas and electric light will be adopted.



The tower is utilised for water supply tanks on two stages, and the upper portion has an observation-room, affording a magnificent outlook over the whole city of Los Angeles and a vast extent of surrounding country.

The lower portion of the internal plastered walls will be finished with moulded and panelled dados, the ceilings of court-rooms coved, and moulded, and panelled; the floors of principal rooms, oak and parquetry, and glazed tiles for corridors, &c.

A Hall of Records, designed in unison with the Court-house, is proposed to be erected on a portion of the site, so that the whole business of the city and county can be conducted in close proximity.

The building was won in open competition by Messrs. Curlett, Eisen, & Cuthbertson, architects, of Los Angeles and San Francisco; and is being erected by Mr. O. E. Brady, of San Francisco, at a cost of 750,000 dols., under the immediate superintendence of Mr. Curlett.

STABLES, OTFORD, KENT.

THESE stables were erected at the same time as the house previously illustrated (see *Builder* for October 16, 1886), and at some little distance from it, upon the estate of Mr. Barclay Field, near Sevenoaks. The buildings adjoin the kitchen garden, and are (as well as the engine-house for electric lighting and pumping from well) upon a steep slope, which had to be excavated for the stable-yard and buildings. For these latter the contract was 3,353*l*. The materials are red brick, with half-timber work above, filled in with plastering and finished with tile roofs. The upper story contains coachmen's living rooms, lofts, &c. The perspective view was shown in the Royal Academy exhibition in 1889.

THE NEW RESERVOIRS AT MONTMARTRE.

WE gave last week illustrations and a description of a number of the picturesque fountains which formed the ancient means of water-supply to Paris. We give this week an illustration of one of the latest and most important additions to the modern system of water-supply to the same city, the section and elevation of the Montmartre reservoirs. This, it must be admitted, is not picturesque, though an effort has been made to give to the exterior a certain imposing and bastion-like character, and the upper surface of the construction has been laid

"THE PHOTO" SPRAGUE & CO., 62 MARTINS LANE, CASTLE ST. LONDON, E.C.

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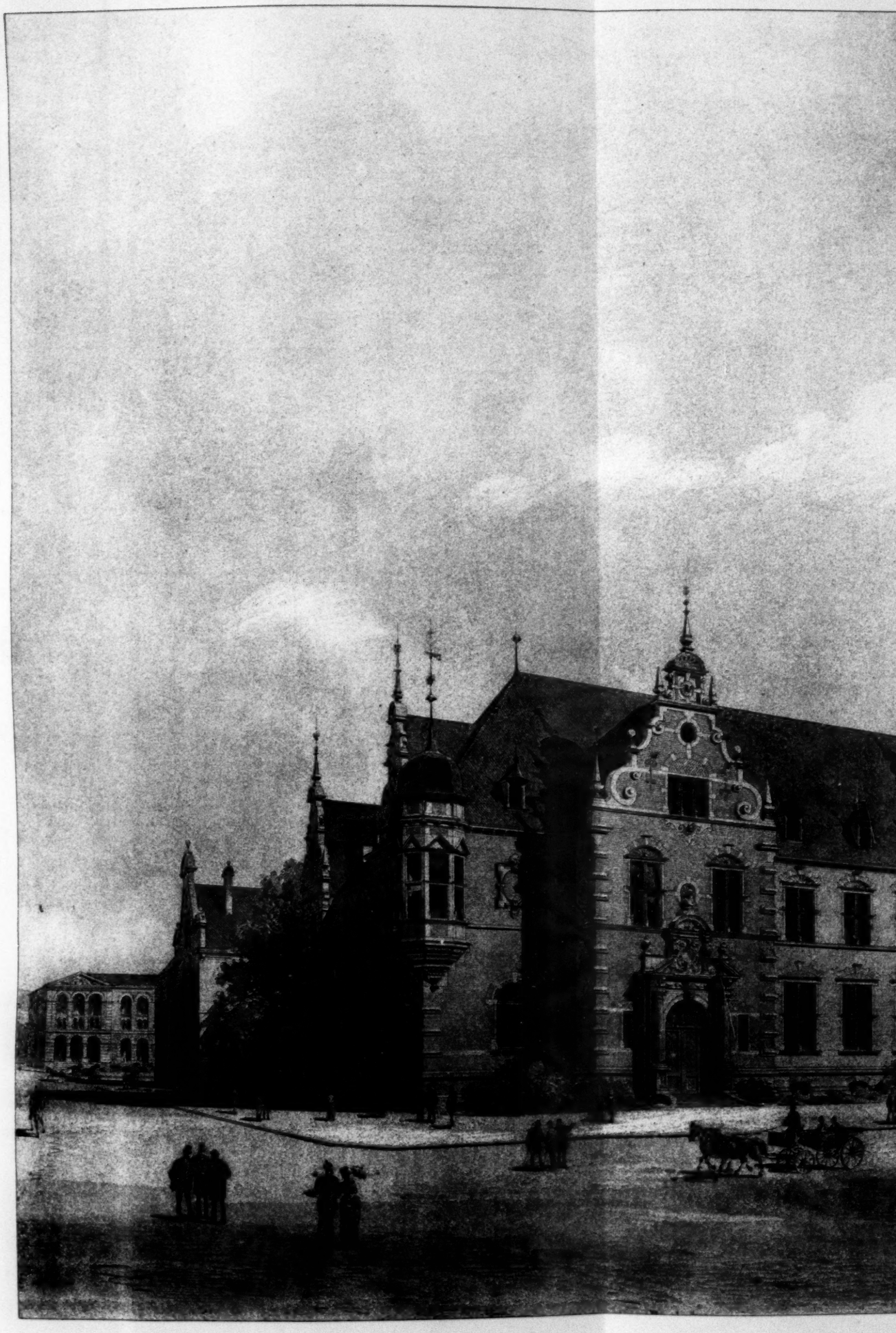

THE BOOKSELLERS' EXCHANGE, LEIPS

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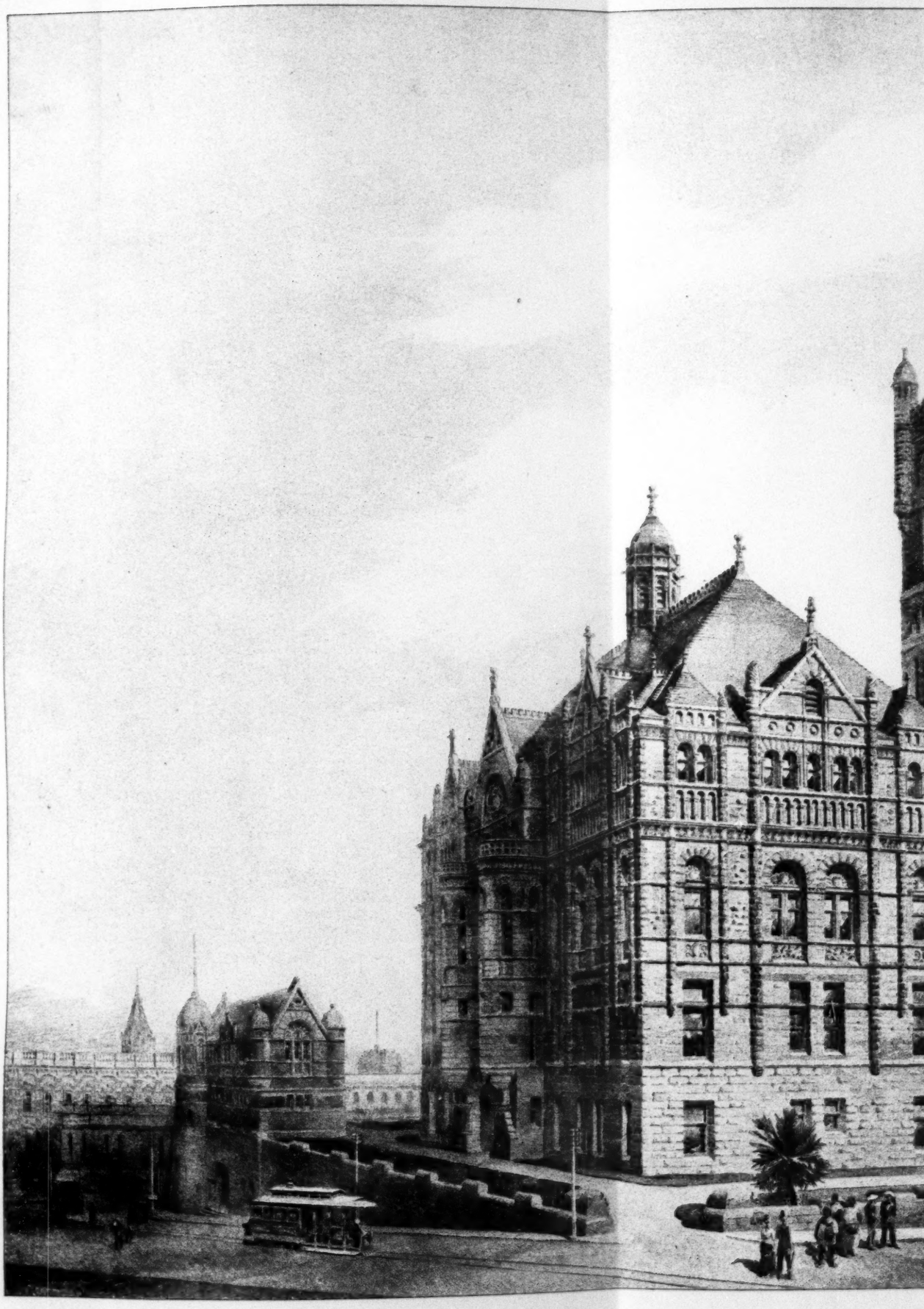
EIPSIC.—Messrs. Kayser and von Groszheim, Architects.



COURT HOUSE, LOS ANGELES COUNTY, CALIFOR

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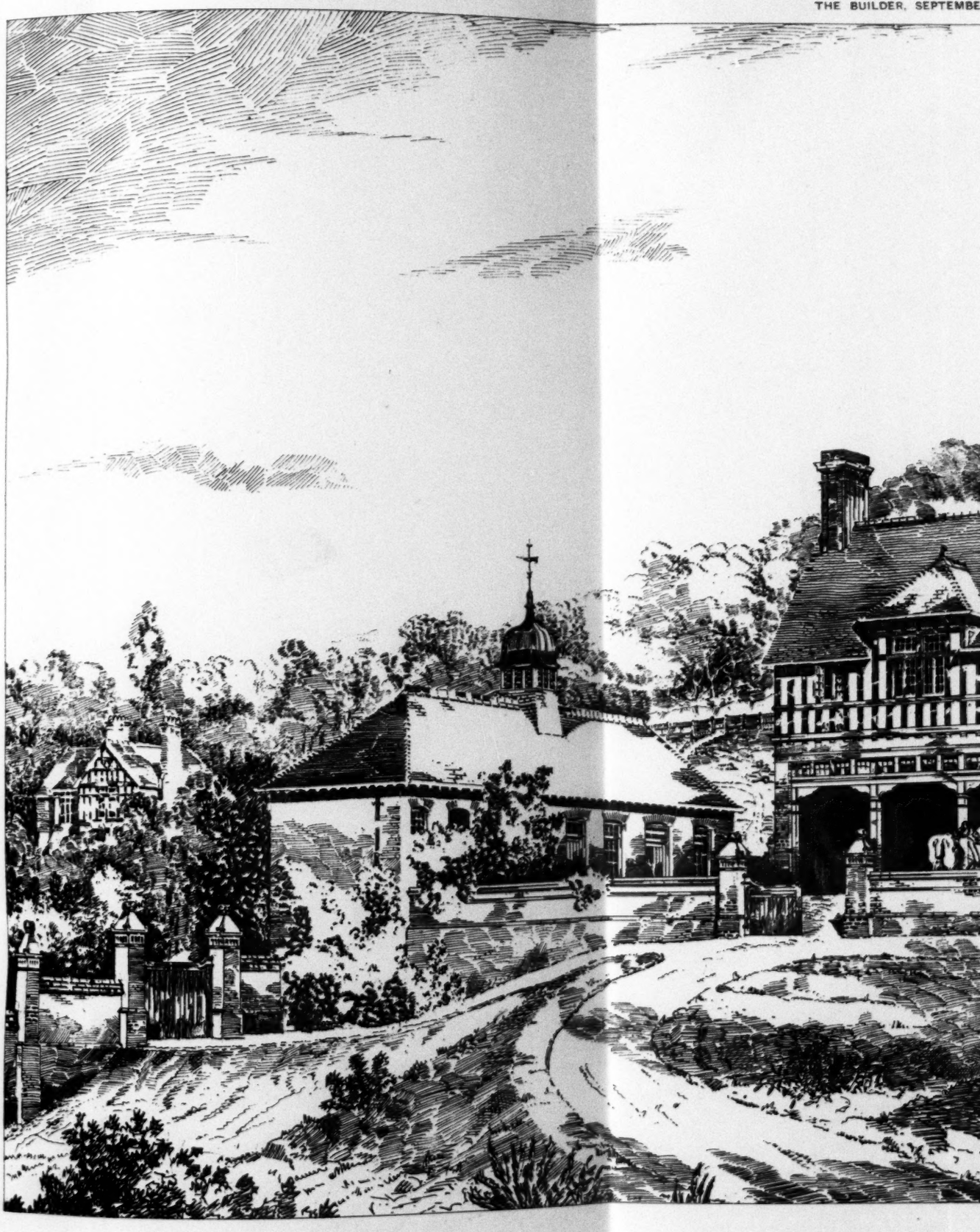
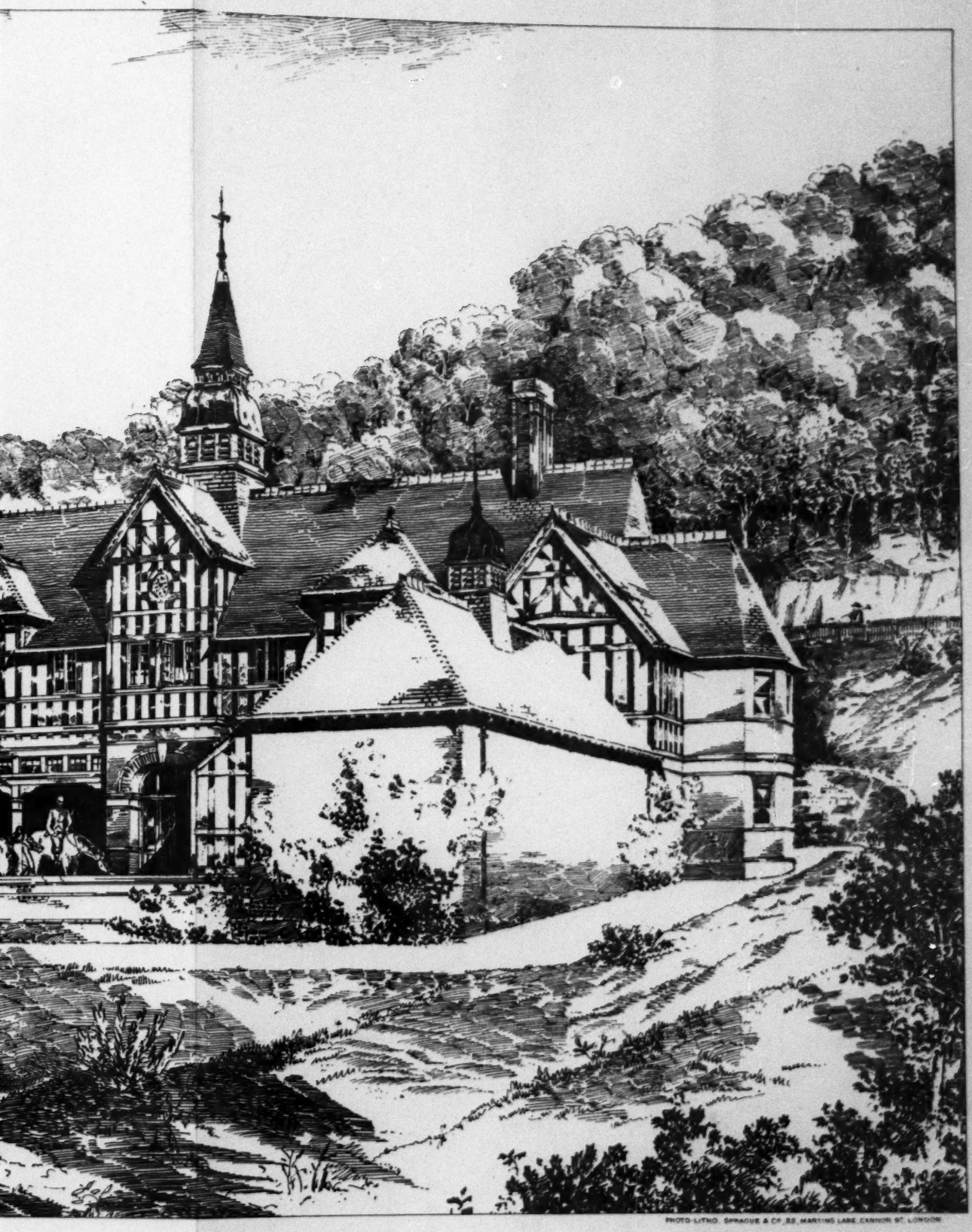
ORNIA.—MESSRS. CURLETT, EISEN & CUTHBERTSON, ARCHITECTS.



STABLES, OTFORD, KENT.—Messrs. Ro

Royal Academy Exhibition, 1889.



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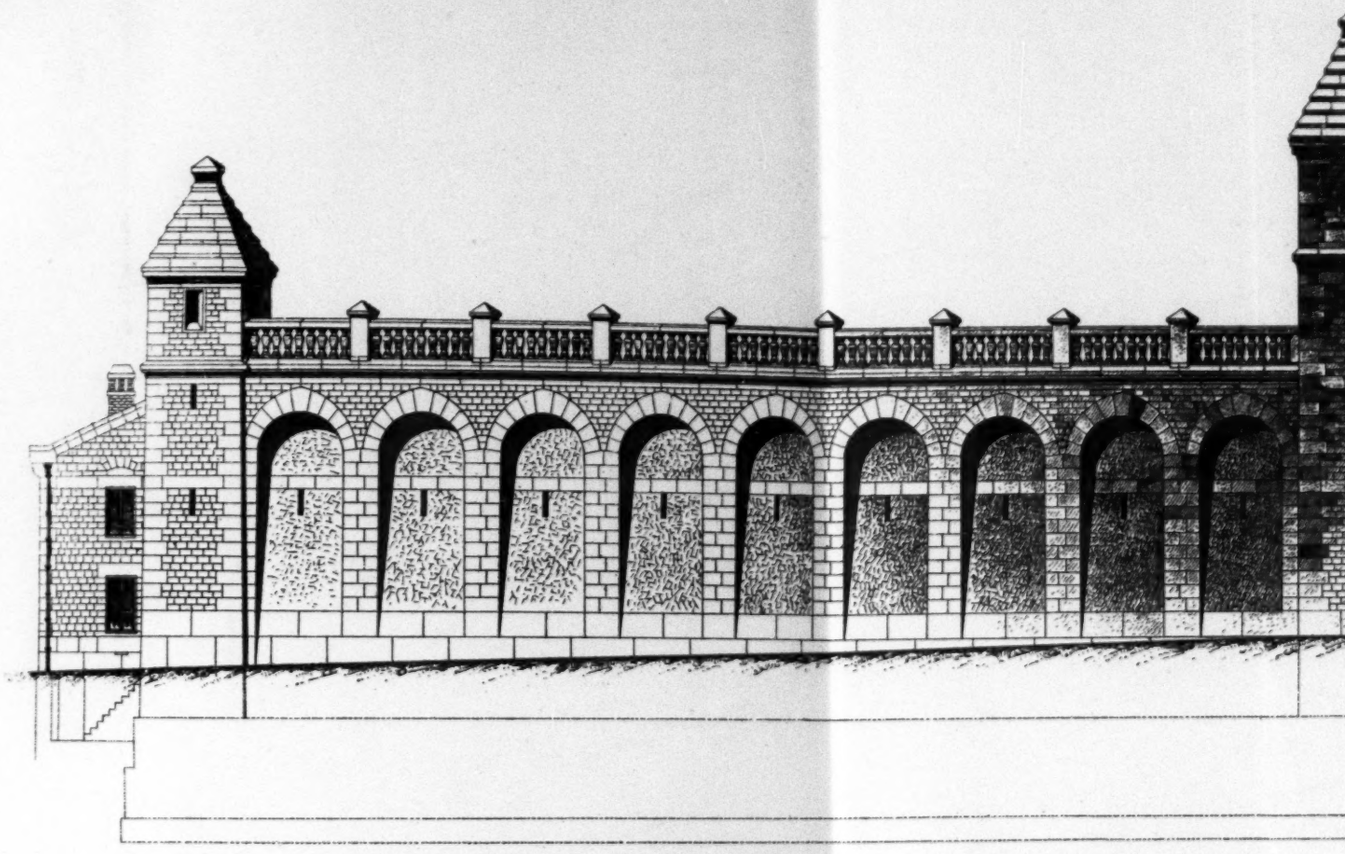
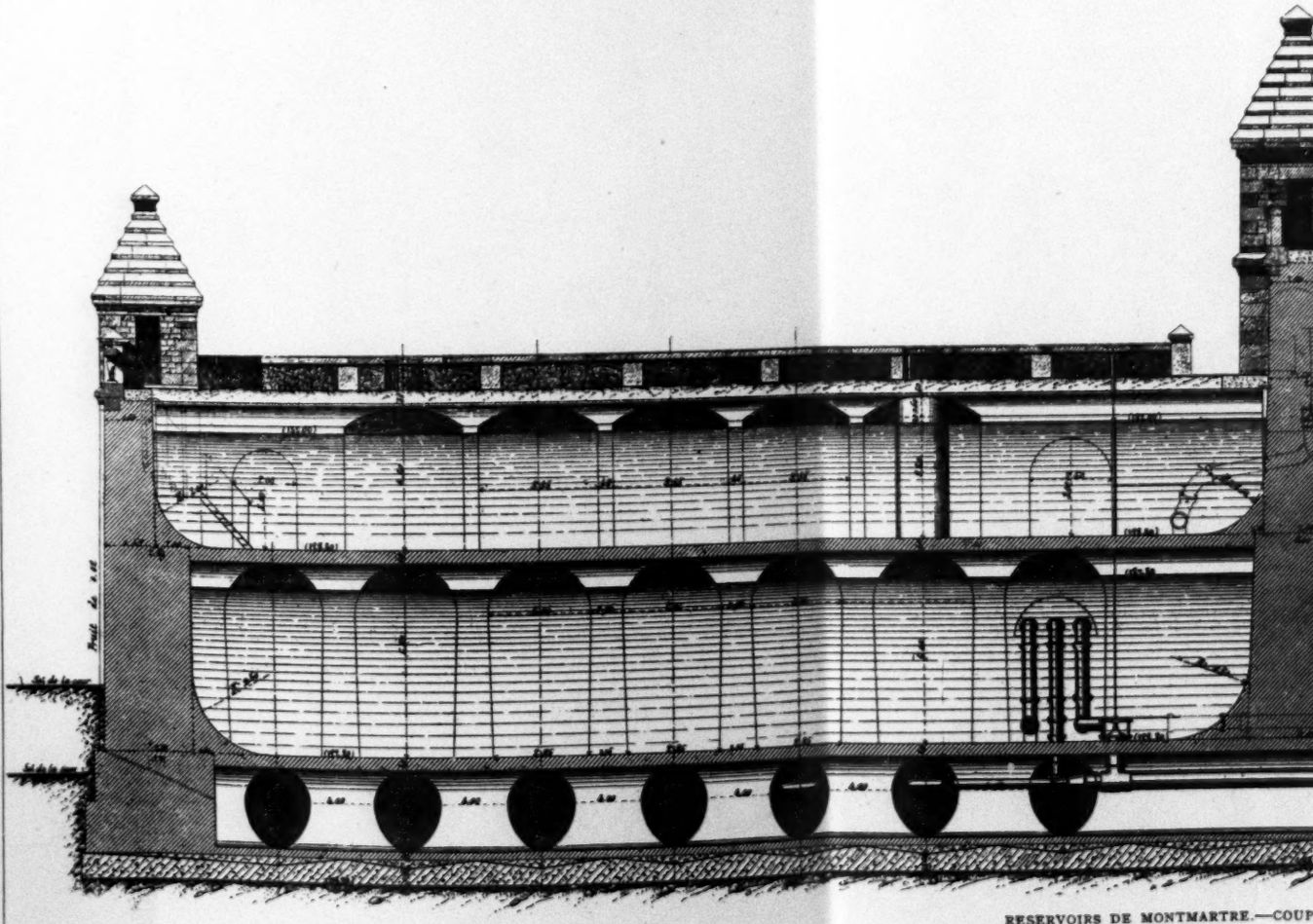
ROGER SMITH & GALE, ARCHITECTS.

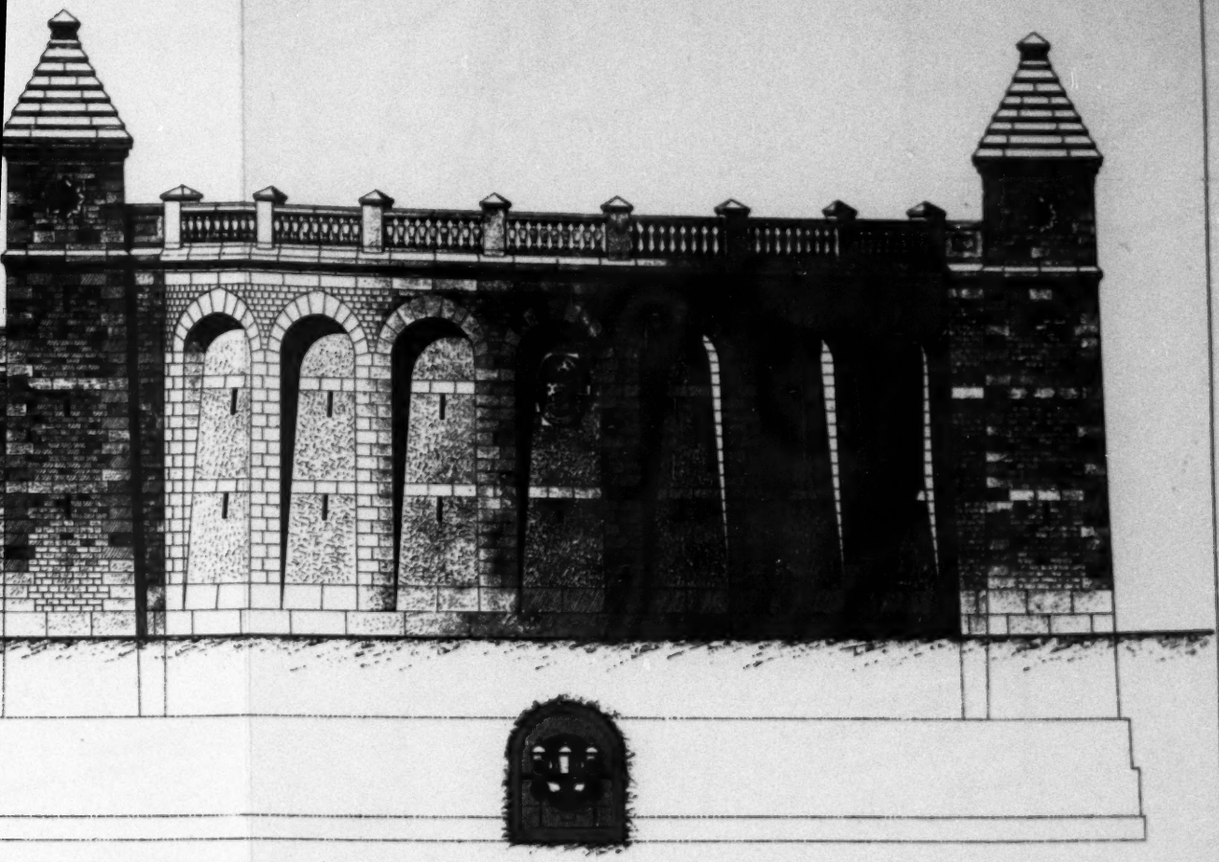


RESERVOIRS DE MONTMARTRE.—FAÇADE PRINC

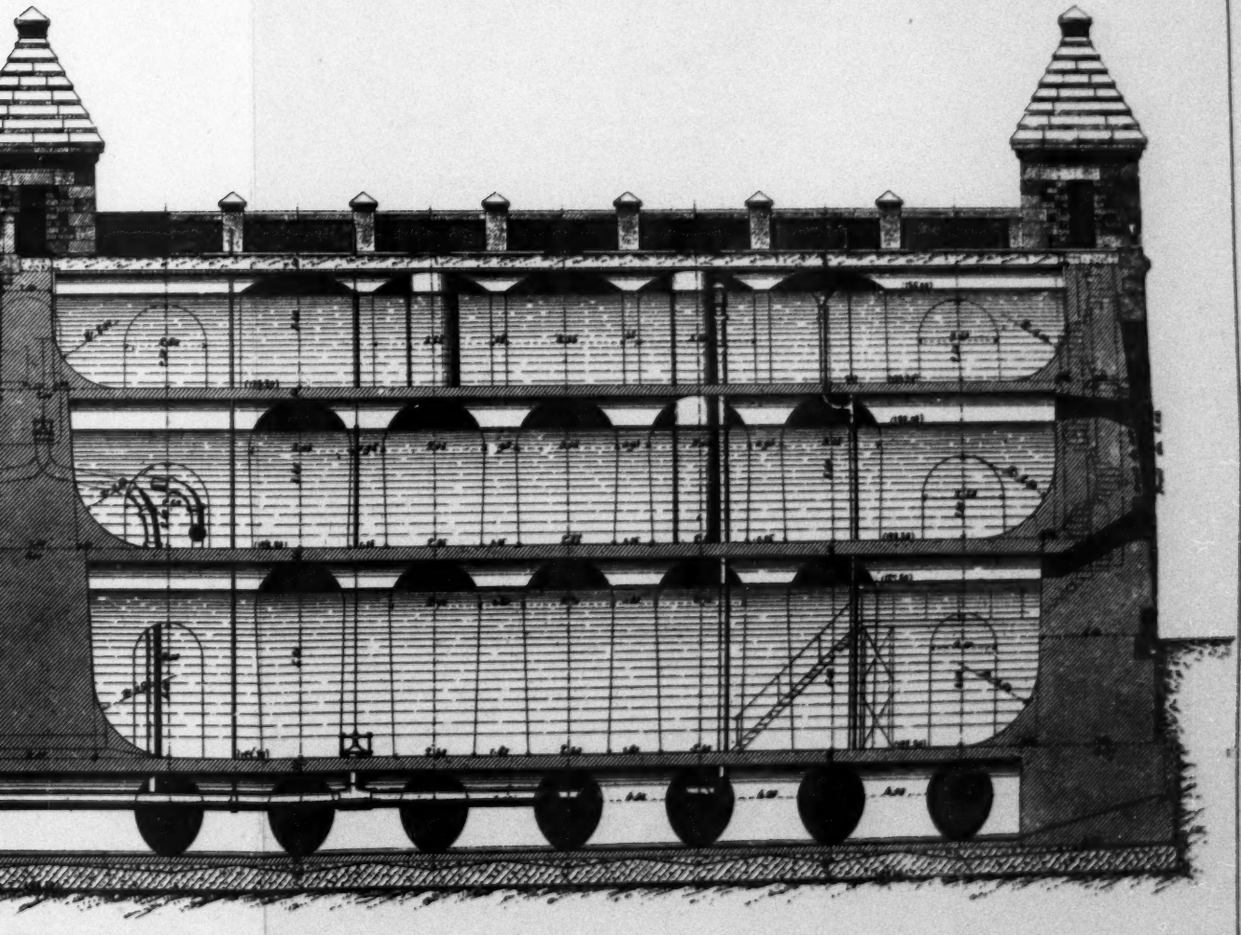


RESERVOIRS DE MONTMARTRE.—COUP

ELEVATION AND SECTION OF THE NEW RESERVOIRS AT MONTMARTR



PRINCIPALE DOMINANT, PARIS.



COUPE LONGITUDINALE.

"ENG. PHOTO," SPRAGUE & CO., 63, MARTINS LANE, CANNON ST., LONDON, E.C.

RTRE, PARIS.—M. JOURNET, ENGINEER: THE LATE M. DIET, ARCHITECT.

out as a terrace garden. A model of the whole occupied a conspicuous place in the pavilion of the Paris Municipality in the great Exhibition last year.

The construction of the reservoirs was entrusted to M. Journet, as engineer, under the direction of M. Bechmann, Chief Engineer of the Sanitary Department. The reservoir is near the church of the Sacré Cœur, and overlooks the whole north quarter of Paris. It is on account of this conspicuous position that some attempt has been made to give the structure a definite architectural character, and with this object the late M. Diet, architect, was commissioned to design the exterior.

The structure is composed of two distinct and separated portions, forming two reservoirs, one a parallelogram in plan, the other with its exterior walls forming segments of a circle: the former, as will be seen from the section, has two stories, the latter three.

The lower stories of each reservoir receive and distribute the water of the river, raised to a height of 75 mètres by the engine at the foot of Montmartre hill, and which pumps directly from the pumping station at Bercy, on the banks of the Seine.

The middle story of the larger reservoir and the upper story of the smaller one receive and distribute the water collected from the reservoirs of the Dhuis at Ménilmontant. The upper story of the large reservoir is to feed a further reservoir situated in another portion of the high ground of Montmartre.

The reservoir has occupied two years in construction, at a cost of 1,024,000 francs.

THE SANITARY CONGRESS AT BRIGHTON.

LAST week* we printed the substance of the address of the President (Sir Thomas Crawford, K.C.B.), and we also gave a description of the Health Exhibition. We now conclude our account of the Congress by giving summaries of and extracts from various papers read thereat.

Earth versus Water.

Section I., "Sanitary Science and Preventive Medicine," was presided over by Dr. G. V. Poore, F.R.C.P., who took as the subject of his address "The Living Earth." He said he applied the epithet "living" to the dark-coloured inert mould which the countryman sees in the fields and gardens, and which the town dweller finds in the flower-pot which holds his struggling geranium. Having shown that the black vegetable mould which lies upon the surface of the earth, is largely composed of organic matter, and that the micro-organisms of the soil are very active in producing changes in organic matter added to the soil,—changes usually in the direction of oxidation, he proceeded as follows:—"Supposing comma bacilli to exist in dejecta, what is the best way to stop their multiplication and accidental passage into drinking-water? Clearly to dry them and place them with other saprophytes. If they be buried in the upper layer of vegetable mould, the sun will dry them; or, even if it be raining, the living filter will stop their passage downwards. The growth of saprophytes will kill them; and if the ground be cultivated, the comma bacilli will be destroyed and nitrified, and pass upwards into the crop, and not downwards into the wells. If, on the other hand, the dejecta be mixed with water, and be taken in an impermeable pipe through the living humus of the surface, to the dead mineral subsoil where the sun does not reach to dry them, and where saprophytes to eat them up exist not, the danger of their finding their way through interstices and crevices into drinking-water appears to me to be very great indeed. That the under strata of the soil are a very inefficient barrier against filth contamination has been demonstrated in all our large towns, and especially in London. In that city the lower rooms of the houses are almost universally below the level of the street, and the house-drains leave the house at the lowest point to reach the sewer at a lower level still. As underground drains, however well laid, are sure to leak in time; their contents escape, and water continually escaping at one point is sure to work a channel for itself, and take its natural course to the nearest stream or well. Still more is this sure to happen if the house-drain leads to a cesspool, a contrivance which necessity invented as soon as we had water under pressure, and began to use it as our only scavenger. In London, a city renowned for its innumerable wells, we have had to close every one of them, and as the excessive dirtiness of the air makes rain-water not available for domestic purposes, we have become absolutely dependant upon the water companies, and it is only quite recently that the public has become alive to the fact that the causes which poisoned the surface wells, are equally poisoning the Thames and the Lea, and the other sources of London water. No thinking being can feel easy about the London water supply, and it is to be hoped that some day the public mind will be roused to an appreciation of the fact that if we want pure water we must make some serious attempt not to foul our wells and streams. I am convinced that in our sanitary arrangements we have not sufficiently distinguished between the living mould of the surface and the dead earth of the subsoil. The living mould is our only efficient scavenger, which thrives and grows fat upon every kind of organic refuse; our only efficient filter, a filter which swells and offers an impassable barrier to infective particles, a filter which affords a sure protection to our surface wells. When we perforate the living humus with a pipe and take our dirty water to the subsoil, we, as it were, prick a hole in our filter, and every chemist knows what that means." Dr. Poore then went on to argue in favour of the exclusion of excremental matter from the sewers; such matter, he contended, should be buried in the "living earth" every day, and household slops should be applied to the top of a different piece of cultivated ground every day. In conclusion, he said that "a nation that fouls its streams and starves its soil is in danger of poisoning and inanition. A nation which imports a great part of its food and a great part of its manure, and systematically and by Act of Parliament throws all its organic refuse into the sea, is undoubtedly living on its capital. Our capital just now is undoubtedly considerable, but we are in a fair way to run through it; and when we have done so who can forecast the future?"

The conclusions arrived at by Dr. Poore were strongly criticised by Sir Douglas Galton, who contended that water was as great a purifier as earth, and that towns with water-carried sewage had proved to be far more healthy than towns where the pail system was in vogue,—and the pail system was what Dr. Poore's proposals implied.

In the same section, Dr. James Turton, M.R.C.S.E., Chairman of the Sanitary Committee of the Brighton Town Council, read a paper "On some Points in Relation to Septic and Infectious Diseases." In the course of it, he said that last year he was called to attend several members of a household suffering from general malaise, headaches, and occasional vomiting. The house drainage was good, but an unpleasant smell was noticed in the kitchen, and the symptoms attacked only the servants and those members of the family who were in the habit of entering the kitchen. He had the flooring taken up, when several of the joists were found to be rotting in places, and emitting the odour complained of. The putrid wood was removed, and a better provision made for ventilating the space beneath the floor. Since then there had been no illness in the house.

Alderman Joseph Ewart, M.D., F.R.C.P., read a paper on "The Sanitary Advance of Brighton." This paper embraced a review of the (*a*) site, environs, and climate of Brighton; (*b*) arterial drainage; (*c*) house drainage; (*d*) the electric light in its sanitary and hygienic aspects; (*e*) reinforcement of the health department; (*f*) the death-rate; (*g*) the effectual dealing with unhealthy houses and areas; (*h*) the more frequent removal of dust, rubbish, and ashes; (*i*) the construction of a destructor; (*j*) the provision of one or more abattoirs; (*k*) the accommodation of dairy cows beyond the boundaries of the borough; (*l*) further extension of bathing accommodation for males and females in northern part of town; and (*m*) the construction of a grand swimming-bath, so situated as to meet the convenience of the people of the town generally, in which all the boys and girls of the rising generation should be taught the art of swimming as an integral part of physical training.

Dr. A. T. Schofield, M.D., read a paper on "The Value of Hygienic Knowledge to Women."

Professor Corfield gave a lecture on "House Sanitation from the Householder's Point of View."

Dr. Arthur Newsholme, M.D., Medical Officer of Health for Brighton, read a paper on "The Bearing of School Attendance upon the Spread of Infectious Diseases." He advocated (1) the compulsory notification of measles and whooping-cough, as well as of scarlet fever and diphtheria; (2) the complete isolation of infectious cases and the quarantine of children in infected houses; (3) that whooping-cough in a house should be no exception to the rule, but should preclude all children of the same house from attending infant schools; (4) that the Medical Officer of Health should give prompt and direct intimation to the head-teacher, of any case of infectious disease among his scholars, and instruct him as to the duration of the infectious period; (5) that teachers shall be strictly forbidden to send children to inquire the cause of absence of absentees, and that a special officer should be appointed for each school to visit such absentees. Further, he urged the importance of instructing parents and scholars in the laws of health. Much mischief in spreading infection was done in ignorance,—an ignorance which was so crass and pertinacious that it was difficult to realise that the sin was not being committed against light and knowledge. With the adoption of these measures he believed that the necessity for the compulsory closure of schools would be very infrequent.

A National Health Service.

The Hon. F. A. R. Russell read a paper on "A National Health Service." He said that the objections to the exercise of a strong and uniform State control and supervision did not hold in respect to infectious diseases. Those evils arose from causes which were well known, and could be greatly reduced by the application of certain well-known principles by a central authority, having the advantage of full information concerning the distribution of infectious diseases throughout the country from day to day, and of the services of sanitarians of the highest skill and ability. Most localities did not take such interest in bringing their districts to a high degree of salubrity, and many Medical Officers received so small a salary that their occupation as such was disregarded in comparison with their private practice, which they were still allowed to pursue. In fact, the Sanitary Acts in the rural districts and in very many small towns were a failure, and through this failure the whole nation suffered. A neglected village might be the cause, through milk, water, or ordinary intercourse, of destructive epidemics in neighbouring or even distant towns or counties. Infective diseases ought, like fire, to be under the constant and effective supervision of an authority for the whole area over which the destructive power was likely to spread if unchecked, and that area, in the case of infection, was the whole country. A Ministry of Health might learn, from the notification already adopted by over three-fourths of the country, the distribution and progress of various diseases, and its officers might be continuously conducting a campaign against them by the best known means. The conditions which favoured the spread of infection were so well known that there would be little difficulty in arresting an outbreak at its inception. The experience of the Westminster Sanitary Aid Association was that even in the midst of a crowded population, and in the case of so easily caught a disease as scarlet fever, it was possible to confine the fever within very narrow bounds. The Sanitary Aid Association of Hastings almost put an end to infectious illness in that town, although, of course, many visitors must have resorted thither before being perfectly safe. In fact, few Local Authorities had attained the degree of immunity from zymotic disease which was really possible for the whole nation to reach, if willing to conform to certain rules which were beneficial both to the sick and the healthy. Diseases arising from impure conditions of water, or air, or milk, could be easily reduced in their places of origin, and prevented from spreading by isolation and disinfection. But the amount of knowledge, training, and authority required to deal adequately with them was such that no body other than a Government or National Department could fitly undertake the task. And when these infections were constantly travelling beyond county boundaries, even a County Council could not keep their ramifications within view. The plan recommended by

* See pp. 169-171, *ante*.

the Joint Committee on State Medicine, of the British Medical and Social Science Associations, still appeared the best which could be devised. By it there was to be created, instead of the many local authorities now existing, one elected and representative body, clothed with all executive functions, whether municipal or sanitary, within the area of its jurisdiction. The Health Officers of the County Boards were to be men of high scientific attainments and acknowledged ability; paid adequate salaries for superintending the whole or a division of a county; to these were to be added Medical Officers of a district, and all were to form one great Department of the State, under the presidency of a Minister of Health, but all these officers were to be under central control, so far as making up one great body of workers for general State medical purposes. The fact was that infectious disease was not merely local, and could not be dealt with effectually by Local Authorities, because if one was active, another was negligent, and they could not attack the enemy with anything like the force or precision of a trained brigade. There was no escape from the urgent need of State control in respect of epidemic and spreading diseases, for a single neglected district was a danger to the whole nation.

Mr. W. H. Collins, F.C.S., read a paper on "The Alleged Danger to Public Health arising from Effluvium Nuisance from Gasworks." He indicated certain ameliorative processes which have been adopted in some of the largest and best gasworks in this country.

Baths for the People.

Professor T. Roger Smith, F.R.I.B.A., presided over Section II., "Engineering and Architecture," and took as the theme of his Presidential address the subject of "Baths." Commencing by describing the Roman thermæ, of which he said that Professor Aitchison's lectures at the Royal Academy last year* had given the most learned and complete account known to him, he went on to speak of "Turkish" baths and vapour baths. Coming to the subject of cheap and popular baths, he said that a very considerable number of establishments, some of them opened as private speculations or by small companies, but for the most part provided under the Public Baths and Washhouses Act, existed. Mr. Rosher stated the number of public baths in England having a swimming-bath as part of their installation at 200, out of which seventy were in the metropolis alone. The avowed aim of many of these was to reach the general mass of the people. In addition to the washhouses, we found in one of these establishments one or more swimming-baths and a series of warm baths. Proceeding to examine the nature of each of these provisions, and premising that those who desired further information as to the Baths and Washhouses Act and its results would find it in a compact and serviceable form in the comprehensive report of Mr. Ernest Turner on the subject, prepared at the time of, and in connexion with, the recent Paris International Exhibition, the Professor said the swimming-bath is necessarily a more or less public institution. It is in its nature large and expensive to establish and maintain, but it is almost unequalled as affording to great numbers a means of healthy, pleasant exercise, and as furnishing an opportunity for the young and others to acquire the valuable art of swimming. No pains should be spared to make it attractive as well as convenient. A swimming-bath of modern construction is a large tank, usually long in proportion to its width, shallow at one end and fairly deep at the other, walled in and roofed over, with a floor all round and numerous dressing-boxes. The interior should be light and airy, the water should be sufficiently warm, perfectly fresh, bright and clean, and the dressing-boxes should secure some degree of privacy. As the swimming-bath, if successful, will be worked pretty hard, it is necessary to have the means of rapidly and thoroughly cleansing every part in use, and of quickly emptying and refilling the bath. Gas should be provided. In some cases provision may be made for employing the bath as a room for public meetings or a gymnasium, or in some such way during the winter time when it is not in request. Let us look into the means of carrying out this programme. The most important part of the whole, the swimming-bath tank, requires to have extreme care bestowed upon its construction, lest it should leak. Portland cement concrete is so well fitted for constructing the bottom and sides that it is not now likely that, save under exceptional circumstances, any other material will be used; formerly brickwork backed up by clay puddle was the best material available, but there was more chance of leakage, and it is said that defects were not infrequent. The pressure of the water against the bottom and sides is not formidable in amount, but the various weights are quite sufficient to cause a partial failure if the foundation gives way, so every care must be taken to ensure an uniform and solid foundation for the bottom, and similar support for the sides, as the smallest settlement will be followed by a crack, and the crack by a leak. Cement concrete is not itself water-tight, and a lining of almost pure cement is required. The actual face of the tank should be of glazed brick or tiles, though when economy is of importance this may be dispensed with. Bands of dark brick or tile running from end to end of the bath are sometimes introduced into the bottom as a guide to swimmers in swimming races. It is desirable to put in at least the foundations of the external walls before beginning to dig for the bath tank, so that the excavation for the baths, when once made, shall not be again disturbed. If the tank be dug and concreted first, the subsequent disturbance of the earth in digging for the footings of the enclosing walls may be enough to cause a crack. Any outlets and inlets required should be decided, as to both size and position, before beginning; and the valves, sluices, &c., put in as the concreting goes on, so that there may be no excuse for disturbing the work and cutting holes in it. I know of one successful case where the side walls of the tank were first formed in trenches, and then the dumpling, or great mass of earth in the middle, was got out, and the bottom put in last of all; but there is some risk of making a bad join, and it is better to excavate the whole before beginning to concrete, and then to do the bottom first, and to bestow especial pains and not to stint material in making the join between bottom and sides. The water at the shallow end should be rather over 3 ft. deep, sloping to about 6 ft. at the deep end, and it is not uncommon to have the deepest point about 10 ft. short of the end, so that persons diving in may plunge into the greatest depth. However this may be, every part of the bath must slope sufficiently to one point, to enable the water to be completely run off from the bottom. For cleansing purposes the corners and the join between the bottom and sides should all be rounded so as to prevent any lodgment for dirt. It is desirable to have along the shallow end a perforated pipe with water laid on, so that when the bath has been emptied the attendant may be able, when necessary, to turn on a shower of water while the tank is being cleaned out. The depth of the water should be legibly painted at the sides in several places. The edge of the paving should be rounded, and between it and the water there should be a space of about 6 in., and here a stout teak rounded handrail, or an iron pipe 2 in. in diameter, should be securely fixed on brackets for bathers to hold. The perforated pipe already alluded to may serve this purpose where it occurs. It is desirable also to fix spittoons at regular distances round the edge of the bath, and there should be a stout step-ladder at each corner. The dimensions of the tank must be settled with regard to the probable number of bathers and the means disposable. Every additional foot adds to the cost of original construction and of maintenance, but adds also to the value of the bath to the bathers. For a public bath, less than 25 ft. width and 60 ft. length of water area is not desirable. The length may, with great advantage, be increased to 70, 80, or 90 ft., then the bath should be 30 ft., or even more wide. At most baths there will be swimming clubs, and races will be sure to be instituted, and these festivals have to be considered. Less than 5 ft. width will not do for a racer, so that not more than five competitors could well race in a 25 ft. wide bath, and four would be more comfortable. It is rather desirable, in the interests of the races, to have the length an even number of feet divisible by ten, then three laps make a similar number of yards, and 60, 70, or 80 yards can be swum readily in a bath 60, 70, or 80 ft. long. The water delivered into the bath, whether pumped up or from the mains of a water company, will be too cold for bathing in most states of the weather; and how to warm it is a most important point, for it is not only essential to be able to raise the temperature from the point at which it is delivered, which may probably be from 50 deg. to 60 deg., up to say 75 deg., or at least 72 deg. Fahrenheit, but it ought to be uniformly raised through the entire mass of water in the bath. If there are cold zones and hot zones in the water, bathers will not like it, and a bath that is disliked will be of comparatively little use to its owners or the public. In some cases hot water and steam is circulated in pipes within the bath itself, the pipes being, as a rule, fixed in a recess formed for them in the walls of the bath. In others a long chamber is formed outside the bath tank and filled with hot-water pipes or steam pipes, and the water is admitted into this cool and returned to the bath warm. In another arrangement the water is drawn off from the bath, heated in a furnace, and returned warm. Sometimes steam is simply blown into the bath itself, an expeditious but noisy way of raising the temperature. Most of these plans are more or less reliable to heat the water unequally, and in more than one of them there is apt to be introduced a pipe, or a jet, or a something which is found to get too hot for bathers to touch without injury. The plan the results of which, so far as my experience extends, are the best, is one differing from all these. It was put up for me at the baths of the Carpenters' Company, at Stratford, by Messrs. Fraser, and I can speak strongly of the success of this apparatus as a means of warming the water uniformly and effectually, and helping to keep it fresh. At the deep end of the bath, and near the bottom, an iron pipe is introduced, which is carried (outside the tank) back to the shallow end, and to which the water has free access. In the course of this pipe is introduced an iron chamber, into which a powerful jet of steam under considerable pressure is thrown; this acts upon the contained water on the principle of a Giffard's injector, and hurries it on, so that it is returned into the bath, travelling at some speed, and of course the water that takes its place is drawn out at the same speed. The steam mingling with the water in the chamber raises its temperature, and the result is that a stream of warmed water is always pouring in near one corner of the shallow end of the bath, while an equal quantity of cold is always leaving at the opposite end. The temperature is, by this simple means, gradually and equably raised to what is required, and is easily maintained; and what is satisfactory is, that the warmth is found to be uniform all over the bath, and that as the water is always in gentle motion it keeps remarkably clear. A method resembling that of Messrs. Fraser, but carried further, is that of Mr. C. H. Rosher. He employs either the steam-jet just described, or a pump, to effect a circulation of the water in the bath tank during the heating process; but he admits the heated water at the bottom of the tank, distributing it over the floor of the bath by discs or spreaders. It is claimed that this method promotes uniformity of temperature, and rapid heating, and prevents steaming from the surface of the bath and loss of heat. With this system of heating this engineer combines a second improvement, directed to secure economical working of a bath. The heaviest expense in working a swimming-bath is usually the cost of water. It will take about 60,000 gallons of water to fill a bath 25 ft. by 80 ft. This, at 6d. per 1,000 gallons, a usual price, will cost 1*l.* 10s.; and should the bath be refilled daily, except Sundays, the expense would be 9*l.* per week for water only, in addition to the cost of fuel used in warming the incoming water. Mr. Rosher proposes to filter and to aërate the water by appropriate machinery placed in a small chamber formed for the purpose, and so to render the same supply fit to last much longer. Filtration will, it is considered, remove the solid impurities, such, for example, as those which the settlement of dust on the surface of the water occasions. Aëration will oxydise, and so neutralise some organic impurity. I believe this system has been successful at Woolwich and other places, where it has been tried; and there can be no doubt that a plan which will diminish the amount of water used in a bath without rendering it less pleasant or less healthy, promises to effect a very great great economy in working. Other plans for filtration have, I believe, been brought forward, but this is the most complete that has come under my notice, and the only one which includes a provision for constantly re-charging the water with air. The rest of the swimming-bath may be dismissed

* Printed *in extenso* the *Builder* at the time, with illustrations.

more briefly. There should be a platform not less than 4 ft., and better, 5 ft. to 6 ft. in clear width at the sides, and 10 ft. at the ends, and at the deep end a stage should be erected for diving. The interior should be bright, but direct sunshine on the bathers is undesirable. A bath is best lighted by a series of ample side and end windows, but generally there is not room for that, and a great skylight has to do duty, which it does very well. There should be ample ventilation, under the control of the attendant, and not of the bathers. Ventilation in a swimming-bath is a little difficult to maintain without discomfort to the bathers, especially when the atmosphere is much colder than the air in the bath. A few steam pipes, or hot-water pipes, to warm the dressing-boxes are of essential service, both to aid in this and to keep the place comfortable in cold weather, though it must not be forgotten that the large mass of tepid water radiates heat into the chamber that contains it. There should be, near the entrance, a small shallow bath supplied with hot and cold water and a tepid spray—often called a soap-hole—for bathers who come in from dirty work and desire to wash themselves clean before plunging into the swimming-bath. A small laundry for towels and bathing-dresses should adjoin, and can be worked by the same boiler as supplies steam for heating water for the swimming-bath and the warm-baths. It will include some tanks, a boiler, a centrifugal wringer, and a hot-closet; and my experience, as far as it goes, is that the hot-closet will be better worked, and with more certainty, if it has an independent furnace, and is heated by hot air, than if the heat be obtained from a steam-coil. Professor Smith then proceeded to describe in detail the requirements of that part of an establishment of public baths which provides warm baths for individual bathers. In his concluding remarks he said:—It must be admitted that, while the operation of the Baths and Washhouses Act has brought a means of bathing within the reach of large numbers of people, it has not gone far enough. I believe it has been the experience of the managers of many of these establishments, that they are not frequented to such an extent as to make them self-supporting; and it needs no long consideration to see that the prices charged, though very moderate even if they reach the maxima fixed by the Act, do not place the bath within the reach of every class of working people; while the mere fact that these establishments must be on a considerable scale, and therefore cannot be very close together, removes them from the easy access of some of those who would use them if they could. Can we bring the bath nearer to the doors of the people, and can we give them a cheaper bath than anything accessible at present? In London and other crowded towns and cities, I have no doubt that simple, cheap, and accessible bathing establishments, formed in crowded neighbourhoods, set up as a rule in existing buildings, and adapted to the wants and the purse of the crowd, would be popular and largely used; and my impression is that they could be made to pay their expenses, and possibly to yield a profit to those who established them. If so, few better openings for practical benevolence seem to exist than the multiplication of appliances of this sort under prudent and careful direction, and I wish the subject may attract the attention of philanthropists. Alluding to the means of cheapening baths, the Professor mentioned the spray-baths provided by Mr. C. C. Walker at Donnington, near Newport, in Shropshire,* where a private bath with clean towel is supplied for one penny. He said that a trial of these is about to be made in London, on the Carpenters' Company's estate at Stratford. He also referred to Mr. David Grove's spray-baths and to Mr. E. A. Reynold's spray-baths as likely to be of very great service in meeting a great public want for cheap baths.

Mr. Alderman Hallett read a paper on "The Brighton Waterworks," which were subsequently visited by the members of the Congress.

Mr. R. E. Middleton also read a useful paper on "Waterworks Regulations" with regard to their bearing on sanitation. He quoted the regulations of the Liverpool Corporation Waterworks *in extenso* as being, perhaps, as complete and simple as any others. He pointed out that it was most desirable, in the interests of the consumer as well as of the water companies, that only reliable plumbers should be employed. Referring to the regulations of the Manchester Corporation Waterworks, he said that No. 15 of those regulations, by which urinals were allowed to be flushed direct from the service pipe if a self-closing tap were used, did not appear to be judicious.

* Described and illustrated in the *Builder* for October 12, 1889, p. 261.

Improvements at Brighton.

Mr. F. J. C. May, Borough Engineer and Surveyor of Brighton, read a paper on "Brighton as a Health Resort." In it he gave a short review of the many important works executed from the year 1858 to 1890, mainly from the plans and under the superintendence of Mr. Philip C. Lockwood, M.Inst.C.E., the late Borough Engineer. Referring to the question of baths, Mr. May said that the Corporation had decided to try the experiment of a system of cottage baths dotted about in the poorest and more densely-populated districts; this will have the effect of avoiding long walks to a central large bathing establishment. It will, indeed, be taking the baths to the people, and it is hoped will be a popular movement. The first institution of this kind is being constructed at the present time at Brunswick-place, North. Here a large house has been hired by the Corporation for a term of years, and is being fitted up with eight baths, four for men and four for women, supplied with both hot and cold water. The establishment will be under the care of a man and his wife, who will reside on the premises. From the interest already taken in the progress of the operations by the class of persons for whose use it is intended, there is every reason to believe the experiment will prove a success. In his concluding remarks, Mr. May said "Having given a brief description of the work already done, it will not be out of place, nor betray any official secrets, if I state that it is not the intention of the Corporation to remain satisfied with what has already been done; but, on the contrary, that there is a strong determination to progress in every direction, and to keep pace with the march of science in the interests of the public health. A public abattoir; a refuse destructor; a grand extension of the sea defences eastwards in the parish of Rottingdean, with suitable drives and promenade; a scheme for the better utilisation of the Tenantry Downs; a yacht station opposite Kemp Town; various street improvements to relieve the congestion of some of the more crowded thoroughfares; and a new Town Hall, are matters which are already engaging the attention of the Corporation."

Mr. W. H. Collins, F.C.S., read a paper on "The Necessity for Improvements in the Sanitary Arrangements of Dairy Farms, and for their more careful Inspection by Sanitary Authorities." He fully proved his case.

Mr. C. Hooper read a paper on "Industrial Dwellings."

Mr. John Hanson read a paper on "The Use of Black Ash Waste in the Treatment of Sewage and Foul Water."

The London Sewage Question.

Mr. Richard F. Grantham, M. Inst. C.E., read a paper on "The Disposal of the Sewage of London on the Maplin Sands." The paper dealt with the proposal for reclaiming a large portion of the Maplin Sands, and for distributing the sewage of London over the reclaiming surface. Reference was first made to the conclusions of the Royal Commissioners on Metropolitan Sewage Discharge, viz., that some process should be used to separate the solid from the liquid portions of the sewage, and that the solid matter deposited as sludge should be applied to the raising of low-lying lands, or be burnt, or be dug into land, or be carried away to sea. The effluent should then either be distributed on land by means of intermittent filtration, or discharged lower down the river Thames at Hole Haven. The steps taken by the London County Council towards the fulfilment of these recommendations were described, and the futility of the steps as a permanent measure, in the opinion of several eminent authorities, was pointed out. Other methods of disposal were also referred to. The difficulties in the way of irrigation and filtration on land were alluded to, and a list of towns was given to show the maximum quantity of sewage applied per acre per twenty-four hours on their respective sewage-farms, from which a deduction was drawn that not less than 10,000 acres would be required for the proper disposal of the sewage of London. It might well be doubted whether so large an area could be properly devoted to such a purpose near the present sewage outfalls, and the cost of obtaining and laying out the land would be very great, especially as a new line of railway had recently been made through that part of Essex, near the Northern Outfall. It was feared that, assuming that the chemicals now used did not sufficiently clarify the sewage, the discharge at Hole Haven would cause as great a nuisance to the river there as it has higher up. It was, therefore, proposed by the author to conduct the sewage away to the Maplin Sands as more advantageous than the alternative of utilising it on Canvey Island, in being further removed from any seaside resort, in being larger, and in course of time making an addition to the agricultural area of the country instead of absorbing any part of it. The general outline of the scheme and the dimensions of the culvert were then described, and the quantities of earthwork and concrete required are stated. The surplus excavation for the culvert would be utilised in forming the embankments of the area of the lands proposed to be reclaimed, which was estimated at 10,000 acres. In order to show the capacity of that area—the surface of which was sand—for absorbing and filtering large quantities of sewage, reference was made to the Craigentinny Meadows at Edinburgh, and other places, and taking for examples the volumes of sewage applied at those places, and the results of experiments made to ascertain the degree of purification at certain rates of filtration, it was proposed to lay out the area when reclaimed partly for filtration and partly for irrigation, dividing it into plots by arterial drains to carry off the effluent, so that the whole volume might be disposed of and ultimately discharged into the Swin Channel without endangering the oyster fisheries, and without risk of nuisance to Southend and other places. The cost of the scheme was estimated at 4,500,000*l.*, exclusive of the cost of land.

The Iron Process for Disinfecting Sewage.

Major C. R. Conder read a paper on "The Iron Process as applied to the Disinfection of Sewage in Barracks and Dwelling-houses." This process was invented by the late Mr. F. R. Conder, M. Inst. C.E., and was described as a self-regulating chemical process for application to closed drains on various scales. The proportional dosing of the sewage with iron in solution was thus rendered practical at small cost. The result was the disorganisation of the sewage into inorganic elements, producing a silt easily dried, and a pure effluent within requirements of Rivers Pollution Committee. The offensive odours were destroyed and the bacterial germs killed, as shown by Government analysis. Its *house application* was by an instrument called the "Ferrometer," intended for about ten people, and requiring to be filled and cleared once a month. This had been applied at Windsor Castle, Buckingham Palace, at various houses of the Marquess of Bute, and by the Duke of Wellington, Lord Salisbury, Lord Lorne, and in some 300 cases in country houses to the satisfaction of those who had adopted it. In its *drain application*, at present the process was only working in England on a small scale. It was adopted at Chichester barracks by the War Office, in 1886, and paid for under agreement that it should first be reported satisfactory by the Commanding Engineer. The number of persons provided for was about 1,000. The process was further adopted by the Admiralty at Eastney Barracks, Portsmouth, in 1889, and after six months trial had been reported successful, and negotiations commenced for applying it for 2,000 persons. The Admiralty analyst reported the destruction of bacterial germs in the treated samples. On the property of the Duke of Northumberland at Alnwick, it had been applied to the Castle and to 1,500 persons in the property, and reported by the clerk of the works to be the best process with which he was acquainted. At Grange-over-Sands, in Lancashire, it was applied in 1889 to 300 persons, and the results found satisfactory. The Inspector of the Local Government Board having given a favourable report, the Local Board of Health was empowered to raise money for the development of the drainage system; and that having been carried out, the process was now being applied to the new drains, and had been reported successful. In these cases the form of instrument consisted of tanks and cones placed in pits by the drains, but the principle was the same as that of the household instrument. Further applications on a larger scale were now commencing at Halifax, in Yorkshire, and at Toronto and other places in Canada. The ad-

vantages claimed for the process were —1. That it can be applied immediately without alteration of existing drains; (2) that it destroys the sewer gases from the point of application, and not merely at the outfall; (3) that the effluent may be discharged direct into any stream without injury to the water; (4) that the expense is very small, and the application simple to maintain; (5) that the silt is inoffensive, and has been shown to make a good manure. The success of the method depended on the proper apportionment and correct position of the apparatus, and on the saving of labour due to the automatic action which secures a constant application. The difficulty hitherto found in dealing with a bulky and offensive sludge was thus overcome.

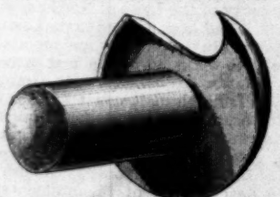
Among the papers read in Section III., "Chemistry, Meteorology, and Geology," were the following:—"On the Climate of Brighton," by Mr. F. E. Sawyer; "On Lead-poisoning from Soft-Water Supplies," by Mr. Percy Frankland, F.C.S.; "On a Case of Well-pollution undetected by Chemical Analyses," by Mr. A. W. Scatliff, D.P.H.; and on "The Ill-effects of Floods on Health," by Dr. A. Haviland.

The last day of the Congress was mainly devoted to excursions and visits to various works and places of interest in the locality of Brighton, and in the evening the Congress was brought to a close by Dr. Richardson's "lecture to the working classes," which was very poorly attended. It dealt with the question of hours of labour, the lecturer going very far in favour of the adoption of the eight-hour limit, and hazarding strong doubts whether "Bank Holidays" as at present observed do not do more harm than good to people.

DISC CUTTING-TOOLS.

THE new Martignoni tool—the sole right of manufacture of which has been acquired by the Machinery and Hardware Company, Limited, of London—is deserving of attention. Its object is to replace the present straight cutter on the lathe by a disc-shaped cutter of slightly spiral form, with a tooth formed in its peripbery like a single tooth of a circular saw. This tooth, which is ground out of the disc and sharpened by an emery wheel on its inner side, forms the cutter. The disc itself is held in position on the lathe or other machine-tool by a strong spindle set at a right angle to the plane of the disc. This spindle is inserted in a cylindrical tube, the two halves of which, being clamped together by a pet screw, hold it perfectly secure. The loosening of this circular grip enables the tooth of the disc to be brought up to any desired position on the bar, rod, or metal to be turned or planed, the action of the ordinary tool-carrier of the lathe, when the disc is fixed, bringing it up to cutting distance for a thin or thick cut as desired.

What is claimed for the new tool is—that it is easier to take out for grinding or exchange; that there is no loss of time in fettling and no constant loss of material by short ends; and thirdly, that a higher speed and a deeper cut than usual can be obtained, as well as cleaner than is possible with an ordinary cutting-tool. We concur in the former statement; and in the second to the extent that fettling is dispensed with, the disc being homogeneous in its metallic state and the tooth being able to be sharpened up to the smallest residue of metal capable of supporting the tooth against its work. The tooth might still even be ground out of the residual disc of smaller diameter, so that the final loss of metal might be very small indeed. The wood-cut shows the disc tool with its one



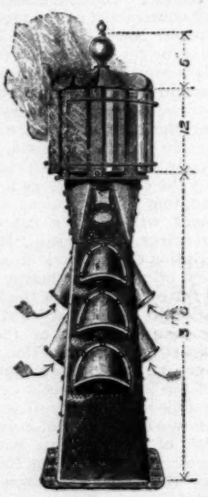
cutting-tooth, and the spindle by which it is held in position. The new tools can be further made of other patterns than simple turning tools. There are already tools made for screw-cutting and spiral or ring groove cutting. The screw-cutting by one of these special disc tools is a very pretty operation, the holder being so made that any desired angle for the cutting-tool can be obtained. In this way it is practicable to make a clean thread of a screw by one cut—the work thus will be done in shorter time than at present, and the running into the material avoided.

For boring purposes the disc-tool is held in the holder by a conical-ended spindle, the holder being formed of a long square bar bored through horizontally, with a recessed taper surface, in which the spindle of the disc fits.

There appears also to be less vibration in the new tool than in the old, and this consideration is one of much value.

FRYER'S REVOLVING COWL.

FRYER'S patent revolving chimney-cowl and ventilator, of which we give a small illustration herewith, appears to possess some advantages worth notice. It has a square base, gradually tapering off towards the head, and thus forms practically a continuation of the chimney-stack. The inlets, which are "bonnetted"



over, are so arranged on the four sides of the base that the outer current is drawn upward. The cowl is claimed to be noiseless in work, and free from friction, the bearings moving in oil, and the cowl revolving with the slightest current of the air. The cowl has an entirely open head, which allows the smoke to escape freely. There is a hinged flap on the top of the head, allowing easy access to the bearings. The cowl is made of galvanised iron, all parts being rivetted. The manufacturers are Messrs. J. D. & W. Fryer, of Brecon.

Books.

Engineering Estimates, Costs, and Accounts: A Guide to Commercial Engineering. By A GENERAL MANAGER. London: Crosby Lockwood & Son.

THIS is an excellent and very useful book, covering subject-matter in constant requisition in every factory and workshop. The preparation of estimates is one of the most important, as well as one of the most difficult and varied, of the duties to be performed in an engineering establishment. At the same time, it is one with which the young engineer gets least acquaintance. The matter of estimates is more one of commercial accounts and personal judgment than of actual engineering. Thus, whilst the articled pupil is familiarized with mechanical details, it is rarely that any useful amount of commercial knowledge is imparted. In this way, the road to managerial and other responsible salaried positions is in a large measure closed to the engineer. In the early formation of businesses, the want of experience in this direction is embarrassing. The primary object of the book before us is to remedy this defect, and to aid those who have a healthy ambition to rise in their profession to salaried positions. The principles and conditions which control the preparation of estimates are set forth with great perspicuity, and are fully illustrated by a number of tangible examples. Not only is it primarily necessary that the capital invested in an industry should earn its legitimate profits by selling the productions for larger sums than the gross cost of manufacturing them and delivering them to the buyers, but it is also most important that the effects of competition should be well considered in framing those tenders which are sent out with a view to securing business. In this view the present book is invaluable, not only to the young engineer but also to the estimate department of every works; we may add, too, of considerable service to the principals themselves by the display of varying practices which is given, and the breadth and soundness of the views set forth. Not only are there details for large establishments, but there are equally valuable details for small works where the technical and commercial duties are performed by the same person. In the preparation of estimates, materials and workmanship are the two main bases of the calculations. The kinds and qualities as applicable to various classes of work, and to particular portions thereof, are admirably dealt with in an extensive series of actual examples, thus furnishing to the inexperienced thoroughly firm foundations for his labours, and reminding the experienced of the chief points in many subjects of consideration. The taking out of quantitiesis a fundamental process in estimating, and very practical examples are given. Very pertinent remarks, too, are appended on the differences and allowances between unfinished and finished work. The experiences of one place and of one period have to be carefully checked, the conditions of workmanship being also modified by the introduction of new tools and appliances. Patented inventions also tend to disrupt old arrangements.

The matter of patterns again is one of much moment, and the suggestions, therefore, as to how patterns in stock may be altered are very valuable.

The most perfect way of estimating is to set forth all the items, adding to the total of probable cost a proportion of the working expenses of the establishment, including management. In this way the gross cost to the manufacturer is ascertained, and the principal adds thereto the profit he thinks he can get from his customer. The other and more general method is to reduce the materials and workmanship to standard rates. This mode gives at once a selling price to the buyer, but furnishes no indication of the exact cost to the maker.

The labour rates and duties are well put forward, alike for ordinary and for outdoor work. Jobbing orders are lucidly dealt with, and the grounds for higher remuneration in such cases well reasoned out. In steam-engines, boilers, heating apparatus, and various other matters, the information and illustrations are equally practical. The author's labours conclude with an essay on manufacturing book-keeping.

The book contains 250 pages, and is a matter of a couple of days' close reading. No one, however, can appreciate it properly without actual perusal; and it probable that even the most experienced will be benefited by so doing.

The Uses of Plants. By G. S. BOULGER, F.L.S., F.G.S. (Roper & Drowley. 1889).

THE object of this volume is best explained by the sub-title, "A Manual of Economic Botany," as it is devoted to an account of the vegetable substances employed as food and medicines, and in the arts, and especially to the additions to the list which have been made during the past fifty years. It is intended as a popular manual, but the subject it deals with is so extensive that the book is necessarily little more than a classified catalogue of the materials employed, the names of the plants from which they are derived, and the countries from which they are imported. The excellent synoptical and general indices, occupying thirty out of the 224 pages, make it a useful book of reference, and the numerous references in foot-notes to other works enable the student to go to the original sources of information made use of by the author. There are no illustrations, which is a great defect in a book of this kind, where the physical characters of vegetable products were described in terse and technical language.

The difficulty of classifying objects derived from so many different sources and employed for so many different purposes is very great, and Professor Boulger has thought it best to arrange them according to their uses, except in the case of medicines, which are arranged botanically. Thus he divides woods and timber into those required for making walking-sticks, for ornamental work and furniture, and

for works of construction. It would appear that a substitute for box-wood for the engraver is a great desideratum at present, and that of the twenty kinds of wood which have been put forward our common hawthorn is the best,—a fact which, we believe, is little known in our country districts. It is distressing to our patriotic feelings to read that such common kinds of timber as oak, beech, birch, and ash are largely imported from the Continent and America, while there is so much of it in this country which cannot find a profitable market. The difficulty lies, no doubt, with our expensive inland carriage, and as the railways are not likely to afford much assistance in this direction, it is to a revival of our long-neglected inland navigation we must look for help for our depressed forest industries. Dr. Shlich, of the Forestry department of Cooper's Hill College, recently stated that we spent twenty millions annually on the importation of timber, and that with proper cultivation of a fourth part of our waste lands this deficiency in our supply could be met.

The section on paper materials is among the most interesting in the book, and we learn from it that not only are numerous new fibrous plants available, but that some of our soft, white woods are being used for paper-making. The time has not yet arrived, we fear, when rags can be dispensed with, and the insanitary results associated with their importation got rid of. On the other hand, while wood is being made into paper, waste paper is being used as a substitute for wood, and is being converted into coach panels and tram wheels, and even into "black patent leather." With the development of this industry we may hope for the disappearance of the disfigurement of our streets and parks by waste scraps of paper. We find no account of the source and botanical character of peat-moss, now so largely imported from abroad and employed as bedding for horses and cattle, nor of the much-increased growth and use of the tomato as an article of popular consumption. The statistics of imports are somewhat antiquated, the most recent having reference to the year 1886; but to keep pace with our ever-widening commerce and the development of new industries would require an annual revision and issue of the work.

Handbook of Athletic Sports. Edited by ERNEST BELL, M.A. Volume I.: Cricket; Lawn-Tennis; Tennis; Rackets; Fives; Golf; Hockey. Volume II.: Rowing and Sculling; Sailing; Swimming. London: George Bell & Sons. 1890.

THE first volume of this series affords a curious though anything but a unique example of the incapability of many writers on games to put themselves in the position of those who have no acquaintance with the game supposed to be described, and to give a clear and logical description of it. According to the editor's preface, the object of this series is "to give in a concise form, by writers whose eminence in their respective branches enables them to speak with authority, *a clear description of each game*, with practical instructions and hints, such as will be helpful both to the beginner and the more advanced player." If that is the object, the book does not answer to it, in regard at all events to the two most important and popular games first described. No one who was ignorant of cricket and lawn-tennis could gain a clear idea from this book of how the two games are played, or of their general principle. The authorised rules are given, but rules do not explain a game. In the Hon. E. Lyttelton's treatise on cricket there are many remarks and hints, written out in a very desultory and haphazard manner, which are useful and suggestive to young players who have learned the game; but there is no clear general statement of the principle and details of the game, or of the ends to be kept in view in bowling, batting, and fielding; there are diagrams of the different placing of the field for fast and slow bowling, but no explanation of the reasons for them; there is a long dissertation on bowling "lobs," but the reader is not told what a "lob" is. If it were our business to write about games, we would undertake to give, within the compass of one column of this journal, a description of the game of cricket from which the uninformed reader would gain a clearer idea of it than he will be able to extract from Mr. Lyttelton's ninety-two rambling pages.

It is not much better with lawn-tennis. The rules are appended, but there is no logical and concise description of the principle and method of the game, which is what a reader ignorant of it naturally looks for. There is a chapter on "the volley," but he is not told what a "volley" is; and so on.

The section on the older game of tennis proper, by Mr. Julian Marshall, is much better done, and here the author gives a complete description of the progress and method of the game. Golf is also intelligibly described. But cricket and lawn-tennis, the most popular and widely played of the games included, are not; and the sections concerning them ought to be re-written, if the book is to fulfil the object professed in the preface.

Vol. II., which treats of rowing, sailing and swimming (which, by the way, are not "sports," but arts) is much more satisfactory, and indeed within the space allotted could hardly be better done. "Rowing" is done by Mr. Woodgate, "Sailing" by Mr. E. F. Knight, and "Swimming" by Messrs. M. and J. R. Cobbett. All three writers (for we may consider the two swimming writers as practically one) are careful to remind the reader that mere book knowledge cannot do more than put a man in the right way of learning what can only be really acquired by actual practice; but at the same time the instructions are so practical and so clearly worded that any tyro who had studied them would enter a boat or enter the water with a distinct idea as to what he had to aim at and what to look out for. The sailing section is especially well done, and contains a good deal of information which is permanently useful for reference; and if this short treatise were studied by those who ambitiously put themselves into sailing-boats at watering-places, without in any sense "knowing the ropes," they would know a little better what to do in an emergency than they sometimes do, and would be aware of some dangers into which people run, and sacrifice their lives, through pure ignorance that there is any danger. The section on swimming has also the merit of being remarkably clear in its description of the methods of swimming, so that a beginner can really learn from it what he ought to try for, at all events. This second volume of the series can be cordially recommended as a very useful one.

"The Great Tower for London" (compiled and edited by F. C. Lynde, A.-M. Inst. C.E., and printed and published for The Tower Company, Ltd., at the office of *Industries*, 358, Strand) is a sixpenny pamphlet containing illustrations and descriptions (the latter being, however, very incomplete) of the sixty-eight competitive designs for the tall tower which Sir Edward Watkin and his friends propose to build at Wembly Park, or somewhere in that vicinity. We sincerely trust that the tower will never be built; but whether it be built or not, the present pamphlet will remain a curious and interesting record of the competition. But it is to be regretted that the compiler's work has been so hastily and meagrely performed. The details given are not always accurate, and we are informed that the cost of one design (No. 19, by Mr. J. W. Couchman) is over-stated to the extent of more than 800,000*l.* As all the illustrations are engraved to the uniform scale of 300 ft. to an inch, their comparative height and bulk can easily be seen. Some of the designs, as we pointed out at the time of their exhibition, are fearfully and wonderfully conceived, and many of the designers (or is it the compiler?) are judiciously reticent in their descriptive notes. —— The "Gas Consumer's Diary," with full directions for reading the index of a gas-meter correctly, and for checking gas accounts (London: The Blackfriars Printers, Ltd., 8, Salisbury-court, Fleet-street) will be found very useful, and well worth the twopence for which it is to be had.——The Report of the North-Eastern Sanitary Inspection Association for the year 1889-90 (Newcastle: Standard Chambers, Neville-street) shows a marked advance on the reports of previous years. It records much useful work done, and we are glad to see that it is directing attention to the question of school ventilation, in which there is much room for improvement in many districts.

FOUNTAINS AT GLASGOW.—At the same time that the Doulton fountain was presented to the City of Glasgow, as mentioned in our last, Messrs. McDowall, Steven, & Co. presented their fine iron fountain which was exhibited in the Glasgow Exhibition, and which has now been erected in Cathedral-square.

Correspondence.

To the Editor of THE BUILDER.

HOT-WATER SUPPLY.

SIR,—Lately I have put into my house a range which was much recommended to me, but which has a very small boiler, without a manhole, and so placed as to be inaccessible without opening brickwork. When, on my return home, the arrangements were explained to me, I wrote to the maker, and am by him assured that the circulation is so rapid as to prevent incrustation, however hard the water be. I admit that the circulation is rapid, but should certainly not have ordered the range had I understood the form and position of the boiler. The article in your number of July 12 induces me to ask you if there is any hope that the rapid circulation will prevent incrustation; for myself I fear that, though it might serve for the soft waters of northern counties, the very hard waters of the oolite will soon choke the whole boiler. ENQUIRER.

*** The rapidity of circulation is governed by the heating power of the boiler,—*i.e.*, a poor heating boiler is not successful in creating a rapid circulation. Now, an efficient, or powerful boiler is a desirable thing in every sense, except its liability to become incrusted more quickly than one of average power, supposing it has regular use. With "very" hard water, the boiler under ordinary circumstances cannot last more than two years, unless provision is made for, and attention is given to, its regular cleaning. Rapidity of circulation can only be due to rapidity of heating; a rapid heating boiler is one that "furs" most (under the circumstances named), but the rapid movement tends to carry the precipitated matter into the flow-pipe also more than it would do otherwise.

"A SANITARY NOTE FROM GREENOCK."

SIR,—Under the above heading, on page 130, *ante*, there is a long article in which, *inter alia*, the system of trapping and ventilating the house-drains at Glasgow is attacked, and fault is found with the Greenock officials for recommending drainage to be done in Greenock on the Glasgow plan. Now, "X. Y.," on pages 130 and 131, does not really find any fault with the Glasgow system of trapping the drains, but with the system in which he says the traps are ventilated. He condemns the practice of putting the ventilating fresh-air inlet gratings directly over the traps, because, as he says, when a water-closet, *e.g.*, is let off, bad air may flow up through this grating. To prevent this "X. Y." advises that "all air openings to or from traps and drains should be carried up as high as the main roof." Now, I do not consider this to be at all necessary in general practice. I have not done it for inlets even of mansions where the expense would have been no obstacle had the plan been worth the candle. I have no objections to siding with "X. Y." in a general condemnation of the inlet ventilating gratings being put in directly over the traps, and especially when those traps are on the pavement and close to building, or the entrance to it. Independent of risk of smells coming up, the traps are often choked at tenement houses, when the gratings are right over the traps, by children putting down umbrella wires, and sticks, &c., through the gratings. Now, in practice, I find that the chokage of the traps and complaints of bad smells from the grating can be easily cured without going to the expense, &c., of carrying up ventilating-pipes to the roof,—viz., by putting a strong iron plate, 8 in. or 10 in. square, over the trap, for examination and cleansing, and then having the fresh air inlet grating a couple of yards, or less or more, according to circumstances, to one side. This has been a common practice in Glasgow for years back, and if Greenock follows suit, the grounds for the objections made by "X. Y." vanish, especially if the work is properly done.—I am, &c., W. P. BUCHAN.

Glasgow, August 30, 1890.

DEPLEMENT OF WATER-SUPPLY BY MANURE.—In the current volume of the Proceedings of the Institution of Civil Engineers some particulars are given of some investigations made by MM. Thornot and Brouardel to ascertain the course of an epidemic of typhus fever at Havre. The conclusion they came to was that the outbreak was due to pollution of a spring at Cotillon from whence water-supply is derived. It appears that towards the end of the years 1886 and 1887 the cultivated plateau of Gainneville, which covers the water yielding layers of Cotillon, had been manured for the first time with the contents of the refuse tubs of Havre. The formation is chalk, under which is a layer of clay, and upon the outcrop of the latter the water appears as a spring. The investigations undertaken show that a chalk spring under these conditions may be polluted at its source. Even a thickness of 22 to 27 yards of chalk does not offer sufficient security against pollution, because contaminating substances may pass through the fissures of the chalk.

The Student's Column.

HOT-WATER SUPPLY FOR BATHS, LAVATORIES, &c.—X.

TANKS, CYLINDERS, &c.: *continued*.

IN regard to the pressure of water from pipes into closed vessels, it should be remembered that the same strain is exerted upon the internal surface of the cylinder or tank with whatever sized supply pipe may be used, whether it be ½ in. or 1¼ in. or larger. The result may be stated as follows. If the water within a pipe having an internal area of one square inch exerts a pressure of 1 lb. for every 2 ft. 4 in. of its vertical height on every square inch within the cylinder, a pipe having an internal area of half this size will only exert half the pressure, *i.e.*, half a lb., or a pipe having an internal area of two square inches will cause a pressure of 2 lbs., but with the ½-in. pipe the pressure of half a lb. will be felt on every half square inch in the cylinder, and with the 2-in. pipe the 2 lb. will be exerted on every two square inches, so that the total result is precisely the same.

In purchasing tanks or cylinders it is very desirable to get them from makers who have a repute for good quality work. No doubt there are small firms who supply excellent goods, but to purchase tanks or cylinders at a low price will almost certainly be found to be false economy, and nothing is more annoying than to find, when charging a new apparatus to test it, that the tank or cylinder leaks at the joints or rivet holes. It is also unadvisable to use these reservoirs of too light a quality, *i.e.*, those tested to a less pressure than they will have to bear. This is very often done with impunity, as, of course, the makers' tested pressure does not indicate the bursting point, and where the pressure is only a pound or two over the maker's test marks no harm will ensue, but it is far better to have the reservoir a trifle too strong, as we have not only to think what it has to withstand now, but also that it will be expected to do the same work several years to come, when it is beginning to suffer from wear and tear.

If a tank is of a large size, or unusual shape, it should have "stays" (rods extending from side to side) within it, as immediately pressure is exerted the sides are pushed out, and it has a tendency to become as round in shape as it can get.

The following are sizes of tanks and cylinders customarily chosen as being suited for ordinary domestic purposes where no special requirements exist. With the smallest form of apparatus having two taps (scullery and bath), 25 gallons; this size, however, will be found insufficient if the demand is more than moderate, by reason of a large family occupying the house, and 30 or 35 gallons would be found more suitable; but regard must be had to the capabilities of the range-boiler; there are exceedingly few 3 ft. ranges that have boilers capable of working satisfactorily with a larger reservoir than 25 gallons.

In a little larger house, say nine or ten roomed, 40 or 45 gallons will be found a convenient size, the kitchen range being 4 ft. (or 3 ft. 6 in. with a fair-sized fire and boiler); in larger property the size must be judged according to the number forming the household, and even the number is no sure index, as baths are indulged in much more by some people than others, and the style of living regulates the quantity of hot water required in the scullery, and it is the bath and scullery taps that make the greatest inroad upon the store of hot water. Sixty gallons is a full size for a residence of some pretensions, and it is unusual to exceed this size in private residences, except in mansions of the largest class, and with a large staff of servants (in which case an independent boiler would probably be required). Too large a reservoir is very objectionable, as it renders the work of the boiler almost futile; it is not so much a great store of hot water that is required as a moderate amount that can be renewed quickly.

PIPES, TAPS, AND OTHER FITTINGS AND APPLIANCES.

The kinds of pipe commonly used in this work are wrought-iron steam tube, galvanised ditto, wrought-iron gas-tube, and lead pipe. There are other kinds less commonly used, such as copper tube, &c.

The tube which has preference in the south of England, and which can safely be recommended before any other, is that first mentioned on the above list. This pipe is in general appearance much like gas-tubing, except that its substance is much greater, and in quality of metal it excels the latter; it can always be distinguished by its being coloured a dull red (except when it is galvanised), whereas gas-tube is always a natural black. Everyone having a reputation to uphold uses the steam-tube; and, although a great deal of gas-pipe is to be found, it will generally be discovered in speculative work of a poor class. The difference in cost between steam and gas tube is about 30 per cent.

There is very little galvanised tube used or needed in hard-water districts, as the only object of the galvanising process is to render the tube fairly rust-proof, and so prevent discolouration of the water and weakening of the pipe itself by oxidation. Now the lime which, as already explained, is the cause of the hardness of water, is one of the best of rust-preventives, and it fulfils its usefulness in this direction by coating the internal surface of the pipe with a thin film of carbonate in a very few days, and the rust difficulty is then quite obviated. In soft-water districts, however, some non-rusting tube has of necessity to be used, as water without lime in it always seems to act so vigorously in rusting iron, and the plain steam tube in these districts causes a good deal of trouble by its being eaten away rapidly and discolouring the water to a greater or less extent. Galvanised tube, if well galvanised, overcomes the difficulty almost perfectly, but care has to be used in fitting it up, as it will not do to forge this pipe in any way (that is, heat it for bending or setting purposes), as the galvanised surface will be injured and rusting ensue, and wherever a pipe is cut and screwed, also, the interior of the socket-joints are all places where rusting cannot be helped.

Pipes are sold which are galvanised on the outer surface only, but it is almost unnecessary to point out that this must be avoided, as no benefit is obtained by the extra outlay. Caution is also necessary to see that when galvanised steam-tube is ordered, the steam quality and strength is obtained, as this material is not kept in stock by everyone, but galvanised gas-tube is.

When galvanised tube has, of necessity, to be used, it is, of course, somewhat necessary to have the boiler galvanised also (or of copper) as the rusting takes place in these almost as badly as in the pipes; but both galvanised pipes and boilers should only be used when circumstances make it requisite, as the acid bath and subsequent galvanising process are considered to be rather detrimental to the iron.

Lead pipes and copper boilers and reservoirs are most commonly used in the North of England, particularly in the Manchester and Liverpool districts, where the soft water requires every consideration. Lead pipes certainly do not rust, but there are other disadvantages connected with this material; for instance, it has been forcibly brought to people's attention that soft water has as vigorous an action on lead (the lead of commerce) as it has upon iron, and the lead which is separated or taken into solution by the water has brought about many serious epidemics of lead poisoning, or plumbism, in various districts, and this lead to the introduction of tin-lined lead pipe, that is, lead pipe having its interior surface of metallic tin, which is not acted upon by soft water in the way described.

Lead pipe has another drawback, and that is its softness, which permits of its being easily stretched or bulged and weakened by every strain that it is subjected to; on this account it is almost impossible to use the sudden shutting plug cocks with lead piping, as the jar or concussion that is occasioned every time a tap is shut soon does serious injury, weakening the pipe and necessitating repairs. This is most noticeable with the taps at the bottom of the house, where a considerable pressure of water may exist, and in these situations the slow-closing screw-down taps should always be used with lead pipes.

SALE OF RAY LODGE ESTATE, MAIDENHEAD.—This property, belonging to the Misses Lassell, was sold at auction last week for 20,000*l*. The sale was keenly contested; and it is understood that, whilst the house and grounds will be left intact, the remainder of the land will be devoted to building purposes.

GENERAL BUILDING NEWS.

THE NEW SCIENCE AND ART MUSEUM, DUBLIN.—On the 29th ult., the new Science and Art Museum and National Library at Dublin was opened by the Lord Lieutenant. The new buildings are situate at right angles to Leinster House, the premises of the Royal Dublin Society, and formerly the town residence of the Duke of Leinster, on the Kildare-street or western side, in the space where the horse show used formerly to be held. The architects are Messrs. Deane & Son, of Dublin. The occasion of the last visit of the Prince and Princess of Wales to Ireland was chosen for the laying of the foundations, and the ceremonial was performed by His Royal Highness the Prince of Wales on April 10, 1885. The builders are Messrs. Beckett Brothers, of Dublin. The Museum building was in November last handed over to the Science and Art Department. In June of the present year the sister building for the reception of the National Library of Ireland was completed. The style of architecture is Italian of the sixteenth century. The cost of the buildings approximately is set down at 120,000*l*. The *façades* of both buildings, which face each other, are over 200 ft. long. They consist of two rotundas, with colonnades and pavilions at the sides. In the centre of the Museum building is a large court, 125 ft. by 75, and opening from it are twenty-four galleries or rooms for the exhibition of objects of interest. On the occasion of the opening ceremony, Mr. Thomas N. Deane, the architect, was knighted, an honour which, the Lord Lieutenant said, was "a fitting recognition of the high position which Mr. Deane had won in his honourable profession and of the excellence of his latest work."

BATHS, STAFFORD.—At a meeting of the Stafford Town Council on the 2nd inst., the Public Baths Committee presented plans for baths, the erection of which they recommended at an estimated cost of 5,300*l*. The scheme includes a Turkish bath, a large swimming-bath for gentlemen, gentlemen's private baths, six ladies' baths, dressing-rooms, &c. The buildings will be three stories high, will be situate on the Green Bridge, with a frontage to the River Sowe. Underneath the premises there will be a boat-house. One of the large baths will hold 80,000 gallons of water, and a smaller one 16,000 gallons. Considerable discussion took place concerning the committee's proposals, but ultimately the minutes were adopted.

CHURCH FOR SEAMEN AT CARDIFF.—A meeting of the building committee for the new Church and Institute for Seamen at Cardiff was held last week on board H.M.S. *Thisbe*. Tenders were opened, and that of Mr. James Allen, amounting to 4,410*l*. and the lowest, was, after full discussion, accepted. Mr. E. M. Corbett is the architect.

THE FOUR OAKS RACE-COURSE, SUTTON COLDFIELD.—It has been decided within the last few days to offer, in building lots, the well-known Four Oaks Race-course, Sutton Coldfield, near Birmingham. There are understood to be mortgages on the property to the extent of some 30,000*l*., and the mortgagees have consequently stopped the operations of the Four Oaks Race Company, and have just put the property up for auction. 35,300*l*. was reached, but the reserve price not having been touched, the estate was withdrawn, and the auctioneer announced that it would be cut up into building plots. The estate is 245 acres in extent, and it was formerly used as the seat of the late Sir John Hartopp, who resided at Four Oaks Hall, which still stands in the centre of the race-course. Another house known as the Dower House stands on the outskirts of the enclosed race-course area, which is 198 acres in extent. Part of the ground is covered by a coppice known as the Lady Wood, and a belt of timber also runs round the greater part of the boundary.

NEW HOSPITAL, BIRMINGHAM.—On the 26th ult. the Marquis of Hertford laid the foundation-stone of a new hospital to be built in Edmund-street, Birmingham, for diseases of the ear and throat. The building is to be in the Queen Anne style of architecture, and will be built of red brick with terra-cotta dressings, and roofed with red tiles. It will consist of five stories. The ground floor is to be used by the out-patients to the number of 200, and will contain rooms for the medical officers, the dispenser, and the secretary. There will also be a strong-room, and a mortuary,—the latter approached from the outside. The first floor will contain two day rooms, two meal rooms, operating room, ward, matron's apartments, baths, with all modern sanitary appliances. The second floor will contain three wards, house-surgeon's apartments, nurses' rooms, linen room, and baths, and all the necessary sanitary arrangements. The third floor will contain kitchen, scullery, and four bed-rooms. There will be accommodation for twenty in-patients. The building will embody the best modern improvements and requisites necessary for a new special hospital. The architect is Mr. J. A. Cossins.

NEW FREE CHURCH FOR INVERNESS.—The Inverness Dean of Guild Court have granted the necessary warrant for the erection of a new church for the Free North congregation in Bank street, Inverness. The new building, which is to be erected from designs by Messrs. Ross & Macbeath, will cost about 8,000*l*.

MODEL LODGING-HOUSES, NEWPORT.—Some model lodging-houses, situate at the corner of Dock-street and Corn-street, and erected of plain stone-work, with fire-brick dressings for the windows, have just been completed at Newport. Mr. John Linton is the contractor and Mr. E. A. Lansdowne the architect. The total cost of the premises has been about 3,000*l.* for the shell and 750*l.* for fittings and furnishing.

STIRLING MERCAT CROSS.—At a recent special meeting of Stirling Town Council intimation was made that a gentleman, who did not wish his name to be made public, had kindly offered to bear the whole cost of restoring the ancient mercat cross of Stirling, which it is proposed to re-erect on its old site in Broad-street. The offer was accepted, and the thanks of the Council awarded the unknown donor.—*Scotsman.*

NEW SCHOOLS, MILES PLATTING, LANCASHIRE.—The foundation-stone of new Roman Catholic schools, to be erected in Varley-street, Miles Platting, was laid on the 30th ult. The buildings are intended to provide for the accommodation of 550 children, and will cost 2,448*l.* The building is to be faced with pressed bricks and stone dressings, and is being built by Mr. M'Gee, of Oldham-road, from the designs of Mr. Leonard Stokes, F.R.I.B.A., of London.

SANITARY AND ENGINEERING NEWS.

CLONMEL WATERWORKS AND SEWERAGE.—The Town Council of Clonmel, in Ireland, lately advertised two separate open competitions for the best schemes for the waterworks and sewerage of the town. A London engineer was engaged as assessor, and, acting on his advice, we understand that the Committee have unanimously adopted the schemes submitted by Mr. W. H. Radford, of Nottingham. The Town Council have this week decided to carry out the waterworks at once under Mr. Radford's superintendence. In the waterworks scheme Mr. Radford proposes to bring the water by gravitation from a mountain stream at Glenmorgan, having a watershed of 1,700 acres, the intake being situate about three miles from the town. Filter-beds, and covered service reservoir to hold two days' supply, will be situate on a hill near the town, the pressure being sufficient to command the roof of the highest building in the town when the consumption is at a maximum. The gravitation main will deliver 548,640 gallons a day at the service reservoir. Water mains, with the usual fittings, will be laid in every street. The population to be supplied is 12,000, and the estimated cost of the engineering works is 11,000*l.* In the sewerage scheme Mr. Radford proposes to lay new pipe-sewers in every street, the sewage being brought down to the outfall works by gravitation. The present sewers are proposed to be used to convey the street surface water into the river. At the outfall works the sewage will be raised by duplicate gas-engines and centrifugal pumps and treated in tanks by chemical precipitation, followed by filtration in filter-beds, the effluent being conveyed to the river Suir. There is a tank under the engine-house for storing the night sewage. There will be arrangements for flushing, inspection, ventilation, and storm overflow. The estimated cost of the engineering works is 8,000*l.*

WATER SUPPLY OF DUNDEE.—Recently a committee of the Dundee Water Commissioners had a meeting with Lord Airlie, at Cortachy Castle, with the object of having the 8,000,000 gallons of compensation water from Lintrathen reduced to 4,000,000 gallons daily, but no arrangement was arrived at.

STAINED GLASS AND DECORATION.

WINDOW, EMMANUEL CHURCH, WESTON-SUPER-MARE.—Another of the windows on the south side of this church has been filled in with stained-glass. The general design harmonises with that of the adjacent window. The subject is "Christ walking on the Sea, and Peter essaying to go to Him." The window is the design and work of Messrs. Joseph Bell & Son, College-green, Bristol.

ALLOWAY CHURCH, AYR.—A baptismal font has just been erected in Alloway Church in memory of the late Mr. James MacNaughton, of Smithfield, Ayr. It is made of Caen stone, according to the design of Mr. J. Macvicar Anderson, London. The basin, which is octagonal, is supported by eight columns, and on each side an appropriate symbol has been carved.

THE CHAMBERLAND-PASTEUR FILTER.—Dr. Kübler, of Berlin, has been making some experiments with the Chamberland-Pasteur filter, a pressureless filter, with porcelain cylinders, which, it was claimed, would give water free from bacteria. The water used was that of the Berlin Waterworks, which becomes infested with bacteria when allowed to stand for a time. The results arrived at were that the filter in question would only give water free from germs for a period of four days at the most. At first the water obtained would be sterile, but after three days or so the filtrate was found to contain an active and prolific water bacillus, which were followed shortly after by bacteria. The latter are described as appearing to grow through the pores of the filter.

FOREIGN AND COLONIAL.

FRANCE.—The towns of Roubaix and Turcoing, which in their progressive extension have for some time been approaching each other, will soon be definitely united by a wide straight road to be driven from the centre of the one town to that of the other.——The National Museums Committee has decided to send to Marseilles the bust of the celebrated caricaturist Daumier, who was a native of the town. The bust is the work of M. A. Lenoir. ——At the town of Saintes, in the Lower Charente, a commemorative tablet has been placed on the house in which the late Jules Castagnary was born, who died in 1888 when occupying the position of Directeur des Beaux Arts.——A permanent exhibition of the works of living artists born or resident in the department of the Lower Seine is to be shortly opened at Rouen, in one of the galleries of the museum.——There has been discovered at Marlotte, a small place frequented by Parisian landscape-painters, a regular factory, as it may be called, for the manufacture of pictures with the signature of Courbet, which have been extensively sold in Belgium and Switzerland.——M. Dubois Pillet, one of the founders of the annual exhibition of "Artistes Independants," died recently at Puy, at the age of 44. He was a devoted disciple of "Impressionism."——A National School of Industrial Art is to be founded at Roubaix in October. ——At Perigueux the "restoration" of the celebrated Byzantine tower of the Cathedral of Saint Front has just been completed. The cupola and the forty-two shafts round the base of it have been, it appears, entirely rebuilt! ——In the competition for a new church at Aix-les-Bains, the design of M. Arthur Bertin of Chambéry has been selected for execution. The second premium has been awarded to M. Joseph Alix of Lyons.——A competition has just been opened for the construction, in the grounds of the asylum of Vaucluse, of small isolated pavilions for paying patients.——In the diocese of Nancy a large church is in course of construction, for which about 200,000 francs of subscriptions are already collected. ——At Lyons the statue of Henri IV. which decorated the façade of the Hôtel de Ville, has been seriously injured from the effects of one of the violent gales with which various places in France have lately been visited.——We regret to hear that M. John Lewis Brown, the well-known Parisian artist, is dangerously ill.

AUSTRIA.—The new great Natural History Museum in Vienna is now fully finished, both as regards exterior and interior. We have already given a full description of the building.

CREFELD.—A serious accident happened here on the 10th ult. During a thunderstorm, accompanied by heavy rain, the front wall of a three-story building (erected some thirty years ago) gave way and fell inwards, causing the whole building to collapse. Of the forty-eight people in the building at the time of the accident, the official report states that twenty-six were killed.

WÜRZBURG.—The municipal authorities have been busy with a scheme for a new bridge over the river Main, to be erected at the south end of the city; and it has now been decided to open a competition for a suitable design for this piece of work, which is to be entirely carried out in freestone. 550,000 marks will be voted for the erection of the new bridge and 150,000 marks extra for the necessary alterations of the embankments pertaining to the work. No difficulty will be experienced with the foundations, the bed of the river showing a durable limestone formation.

REGENSBURG.—On the 25th of last month a statue of the deceased King Ludwig I. was unveiled here with all due ceremony, the likeness of the monarch having been placed in the famous "Walhalla" of the town. The monument is worthy of note for the quality of the material used, the stone of the statue (a block some 9 ft. high, weighing 400 cwt.) having been brought from the quarries of Tacca Bianca, and showing a very fine grain and colour.

MISCELLANEOUS.

THE ENGLISH IRON TRADE.—The English iron market is somewhat quieter, and its tone is not quite so strong as it was a week ago. There has, however, been no essential weakening of prices. The only giving way has been in pig-iron. The Glasgow warrant market has been easier, and, owing to this, consumers of Scotch makers' iron have been buying less freely, without, however, bringing down makers in their quotations. Middlesbrough iron has been more sensitive, and No. 3 foundry has dropped 1s. 3d. a ton, to 46s. Hematites, on the other hand, have resisted the reaction, and are quoted by makers 6d. a ton higher. In Lancashire, Staffordshire, Derbyshire, and Lincolnshire brands no reduction has been made. Manufactured iron keeps firm, and some makers even ask more money than last week. Black sheets have been advanced 2s. 6d. a ton. There is only a moderate business in steel, but prices have a hardening tendency. A better tone prevails in the shipbuilding trade, and is due to more orders having been placed. Engineers continue well employed.—*Iron.*

DISCOVERIES AT SILCHESTER.—The explorations which are being carried out on the site of the Roman city of Silchester, a few miles distant from the Aldermaston or Mortimer stations of the Great Western Railway, under the personal direction of Mr. G. E. Fox, Mr. W. H. St. John Hope, Mr. Mill Stephenson, and Mr. W. K. Forster, of the Society of Antiquaries, are (according to accounts which we have seen, especially a long article in the *Reading Mercury* for the 30th ult.) being attended with most satisfactory results from an antiquarian point of view. Until the present work nothing was known of the great western gate of the city except its site, but the present excavations have disclosed most interesting remains of this gate, under which passed the traffic along the main road through the Roman city. The roadway at the west gate was spanned by two arches. Among the massive fragments of the masonry uncovered is the impost of the gate, from which two arches sprang, and the mouldings on one side may be noted cut away in order to allow the doors to shut against it. There are found to be two guard-rooms on each side of the gate, those on the south being most perfect. The wall here has a thickness of 12 ft., which decreases as it rises from the ground level, and it is backed by a great mound of earth. One point for investigation is whether or not this mound is of earlier Celtic origin. A paving of flints forms apparently a pathway to the top of the mound. At the west gate a fragment of a fine Corinthian capital has been found. As it has no connexion with the structure it was apparently brought there for some purpose during the occupation of the city. The remains of the west gate are admirable specimens of masonry, large blocks of oolite and other stone having been employed. A house has been excavated at the north-west corner, the museum, in fact, standing on a corner of it. Traces have been found of another large house at the north-east corner. Between the two houses there is a considerable area of open ground. The explorers are led to conjecture that in each square there may have been a certain number of houses with much open ground, consisting of court-yards and gardens. From its size and from the remains it is considered that the house excavated was that of one of the wealthier inhabitants of the city. During the excavations, and principally at the *insula*, a large number of objects of antiquity have been unearthed. These have all been carefully labelled and classified, and occupy shelves in the temporary office. The exploration is being carried out with the sanction and approval of the Duke of Wellington, who owns the site of the city, and with the co operation of the Duke's agent, Mr. Walter Mousley, and the tenant, Mr. Cooper. His Grace has also promised to give the site of the museum and to contribute towards its erection.

PICTURES AT LIVERPOOL.—The annual picture exhibition opened this week, the private view being last Saturday. The exhibition includes several of the most noted pictures of the year already exhibited in London; Sir F. Leighton's "Bath of Psyche," Mr. Collier's "Death of Cleopatra" (which does not seem to give much satisfaction, the critic of the Liverpool *Daily Post* rightly complaining that the pathos of the subject is killed by the prominence given to the architectural surroundings), and Mr. Holman Hunt's "Flight into Egypt," about which much sentiment seems to be expended. The exhibition is said to be quite equal to its predecessors, and local artists are well represented.

PROPERTIES FOR SALE.—By auction, at Llangollen—(1) Tyndwfr, overlooking the Vale, together with the neighbouring Pengwern House and farm lands—extending over 1,053 acres in all, and yielding a rental of about 1,320*l.* per annum. The mansion and Pengwern House will be put up in two lots of 419 and 473 acres respectively; the remaining twenty-one lots consist of various small holdings, all under cultivation. (2) Plas-pen-y-Nant, newly rebuilt, with 140 acres, finely situated, above the Vale and the River Dee. Pengwern Hall was in olden times the home of Tudor Trevor, Lord of Bromfield, *circa* 925, from whom the Mostyn family claim their descent. By auction at Edinburgh—(3) The Clunie Estate, Perthshire, comprising 1,360 acres (of which 890 are arable), situated in the Stormont District and watered by the Lunan, a tributary of the Isca. This property contains Loch Clunie, wherein is the island, reputedly artificial, on which George Brown, Bishop of Dunkeld, built a former fastness of the Earls of Airlie. The ruined castle stands a rival to Elliock, or Sanquhar, in Dumfries, as the imputed birthplace of the "Admirable" James Crichton (died 1581). On the loch's western side was a hunting-seat of Kenneth MacAlpine, scourge of the Picts. In the parish of Clunie,—the Keltic Cluaine, or green pasture among the woods,—are numerous tumuli and cairns, vestiges of combats between the natives and the Romans. (4) Invermay, in Strathearn; about 3,890 acres, with a rental of 2,642*l.*, excluding the mansion and shootings, at an upset price of 95,000*l.* The house stands on the western slope of the Ochil Hills; its policies stretch to the May's bank, and include the subject of Mallet's ballad, "The Birks of Invermay." That small but beautiful river rises in the Ochils, and, flowing through Forteviot, enters the Earn about a mile above Dupplin Castle. In its course are two celebrated falls: the "Humble Bumble" and the linn of Muckersie.

Here, too, are some ancient remains: Forteviot formed a Pictish stronghold; on heights above the May are a Roman camp, and, close to Forgandenny, the large circular stone fort, known as Castle-law, supposed by some to be of Danish construction, overlooking Strathearn and the carse o' Gowrie.

IRON ROOF FOR GREAT RANGES OF TEMPERATURE.—A description is given in a foreign technical publication (*Zeitschrift des Vereines Deutscher Ingénieure*, 1890, p. 15) of the iron roof for the Finland State Archives Office at Helsingfors, which has been designed to withstand the wide ranges of temperature that are experienced in that country. The hall which this roof covers is 72 ft. 5 in. in length, by 43 ft. 2 in. wide. The principals, which are of ordinary construction, are 8 ft. 3 in. deep in the centre, with depressed tie. They are carried on roller bearings at each end, to admit of free elongation and contraction of the exposed roof-surfaces, trusses, and rafters. The ceiling, which is framed in iron, is at a level of 2 ft. 6 in. below this tie-rod, and its rigidity and protection from the excessive variations of the external temperature are secured by the extension of the king and queen rods to a parallel tie below, built into the wall at each end, the intervening space being filled in with brick vaulting.

TECHNICAL INSTRUCTION AT KING'S COLLEGE, LONDON.—We have received from Professor Banister Fletcher some particulars of the proposed work of the Department of Technical Instruction at King's College. In Building Construction and Architecture, we learn that the Carpenters' Company, acting in connexion with the Council of King's College, have resolved on establishing at King's College in the Strand, evening lectures on Building Construction and Architecture, and Drawing classes. The lectures will be given on Mondays, from 7.15 to 8.15, by Professor Banister Fletcher. Each course will last twelve weeks or thereabouts. The subjects include Foundations, Brickwork, Building Stones, Timber, its several forms and uses; Iron, and its use in building; Limes, Cements and Concrete, Masonry, Fireproof Construction, Carpentry (roofs and their construction), Plastering and Materials, and Plumbing and Sanitation. The Drawing Classes and Classes of Design will also be held on Mondays, from 8.15 to 9.15, by Professor Banister Fletcher, assisted by a demonstrator. Students nominated by the Carpenters' Company, for either the lectures or the drawing classes, will pay half fees. There will be an examination at the end of each term. The first course will begin on Monday evening, October 6. We also learn that the Carpenters' Company (Harben's Gift) acting in connexion with the Council of King's College, London, have resolved on establishing at King's College classes for instruction in wood-carving. These classes will be held on Monday, Wednesday, and Friday, in the day from twelve to four, and in the evening from six to nine. The teachers will for the present be Messrs. Barnes, Curran, and Howard, all practical wood-carvers, and Members of the Institute of British Wood-Carvers. Each course will last twelve weeks or thereabouts. The fees for these lectures and classes will be very low. Professor Banister Fletcher has also sent us the syllabus of the classes of architecture, building construction, and modern practice, which he will conduct in succession to Professor Kerr. These courses are intended to furnish full information in the theory and practice of architecture and building construction, and in the application of the principles of mechanics to construction. They are also specially arranged to enable architects' pupils, improvers, and other gentlemen intending to follow the profession of architecture, to prepare for the progressive examinations of the Royal Institute of British Architects as set forth in their "Kalendar." We learn that in connexion with these classes Professor Banister Fletcher is forming what he hopes will become the most useful architectural and building construction museum in London. In addition to the cost incurred by the Carpenters' Company in relation to this work, they are spending 600*l.*,—"Harben's gift,"—in building a room at King's College for wood-carving, and 150*l.* in improvement to the carpenters' workshop.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

6,358.—CHIMNEYS AND VENTILATION: *T. A. Meggison and another.*—According to this invention, an outer casing and an inner flue are so arranged that by the passage of the wind an up-draught is caused, and the smoke or foul air exhausted from the shaft.

6,880.—WALLS FOR BUILDINGS: *M. Hellinger.*—This invention relates to a method of dispensing with framework in building-up walls by means of plates. Buildings are made so that they are provided with double or multiple walls, forming air-spaces, the walls being built of plates artificially produced in any material containing magnesia, the plates being connected with each other so that they form a rigid self-supported structure.

13,007.—BOLTS, &c.: *H. Beaumont.*—By this invention bolts are made with a secret or not observable locking appliance, mainly for the purpose of preventing the unauthorised opening by children and other persons, and specially as a safeguard against burglars, as they cannot be forced by a jemmy or other sharp tool. A tubular or recessed part of the bolt contains a secret locking appliance in combination with a catch on the plate.

19,193.—CLOSET CISTERNS: *G. A. Muller and others.*—This invention relates to cisterns having syphon discharge, the distinguishing feature of the invention being the construction of the stand-pipe in such a form that a portion of it is nominally above the water level, but can be submerged to start the syphon action.

6,922.—SASH-FASTENERS: *E. G. Whitehead.*—By means of a lever, rod, and spring, a catch is arranged to hold the window-sash in any desired position. The invention is principally useful for railway-carriage windows.

9,239.—BRICKS: *D. Hart.*—According to this invention, bricks are made of any material or colour, but on one or more sides of each brick, a square-shaped projection is formed the whole depth of the brick, and about one-third of its entire width. On the opposite side are formed cavities corresponding in shape and dimensions with the projections. Thus each brick fits into the other and strength is secured.

NEW APPLICATIONS FOR PATENTS.

Aug. 18.—12,922, G. Helmore, Window Sash Fasteners.—12,944, R. Marsh, Decorative and Adjustable Frames for Tiles.

Aug. 19.—13,007, H. Lake, Machine or Apparatus for the Manufacture of Metal Lathing.—13,032, Y. Knee, Self-flushing Cisterns, applicable to Waterclosets.

Aug. 20.—13,059, H. Lamplough, Paving and Flooring.—13,078, T. Fawcett, Machinery for Making and Pressing Bricks.—13,105, A. McLean, Decorative Artificial Stone.

Aug. 21.—13,134, C. Abel, Manufacture of Bricks, Pipes, Slabs, &c.—13,141, W. Drayson, Waterclosets.—13,155, L. Jahn, Firing of Pottery.—13,156, S. Jenkinson, Protector for Wood-working and other Machines.—13,166, J. Garner and E. Craddock, Air-tight Cover, particularly applicable for Cisterns.

Aug. 22.—13,203, Empson & Hewett, Syphon Flushing Cisterns.—13,216, J. Grainger, Concrete Ventilated Building-block for building purposes.—13,218, E. Greenwood, Ventilating Rooms.—13,227, C. Bonne, Manufacture of Cement, such as Portland or Slag Cement.

Aug. 23.—13,279, E. Hindle, Drain Pipes.—13,282, J. Kirkman, Construction of Kilns or Ovens for Burning or Baking Pottery, Bricks, Tiles, and the like.—13,306, G. Farini, Spring Door Hinges.—13,315, G. Redfern, Roofing Tiles.—13,318, W. Henley and others, Construction of Windows and Sashes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,904, G. Martin, Glazing Sash-lights and Skylights.—C. and E. Woodliff, Window-fastening.—9,065, T. Streeter, Water Waste-preventer.—9,230, A. Baker, Drains and Sewers.—9,911, T. Peake, Gate Hinges.—W. Hitchin, Window-fasteners.—10,614, W. Morison, Door-closer.—10,764, L. Posgate, Lime-sifter.—10,944, A. Booty, Ventilation.—11,180, J. Morris and A. Ramsden, Flushing Syphons.—11,344, J. Bishop, Ventilation.—12,136, T. Harries, Grates.—12,301, W. Clark, Syphon Water-waste Preventer.—12,508, F. Priscette, Flushing Apparatus.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

15,140, J. Kaye, Releasing and Opening Doors.—10,243, J. Schwarmer, Sewer for Traps.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

AUGUST 20.—By *T. G. Wharton* (at Caterham): The residence called "Albert Lodge," and 2¼ acres, Upper Caterham, f., 595*l.*

AUGUST 21.—By *T. G. Wharton* (at Walton): 1 and 2, Anderson's Cottages, and the "Prince of Wales" beer-house, Walton-on-Thames, f., 2,110*l.*

AUGUST 26.—By *Debenham, Tewson, & Co.*: "Ray Lodge," and 28a. 1r. 36p., Maidenhead, Berks, f., 20,000*l.*; "Allen's," "Dillons," and "Westlands" Farms, containing 143a. 3r. 17p., Cuckfield, Sussex, f., 2,000*l.*; "Ashfolds" Farm, containing 47a. 1r. 4p., f., 600*l.*—By *J. K. Coleman*: 18, 20, 22, and 30, Upper-st., Plaistow, f., r. 72*l.* 16s, 630*l.*—By *Broad & Wiltshire* (at Barking): 10, 11, and 12, Back-lane, Barking, f., r. 35*l.* 2s., 210*l.*; 10 and 12, The Broadway, and 2, 3, and 4, Back-lane, f., r. 52*l.* 16s., 655*l.*

AUGUST 27.—By *Jones & Son*: 7 to 14, Oley-pl., Stepney, u.t. 56 yrs., g.r. 28*l.*, r. 249*l.* 18s., 1,800*l.*; Lower Chapman-st., St. George's East, an improved rental of 22*l.* 6s. 6d., u.t. 10 yrs., 65*l.*—By *J. Bott*: 257 to 267 (odd) and 285 and 287, Railton-rd., Herne-hill, u.t. 56 yrs., g.r. 50*l.*, 1,200*l.*—By *J. Hibbard*: 106, Bridport-pl., Hoxton, u.t. 41 yrs., g.r. 4*l.* 4s., r. 30*l.*, 315*l.*; 58, Alma-st., u.t. 44 yrs., g.r. 5*l.*, r. 30*l.*, 330*l.*—By *G. B. Smallpeice* (at Woking Station): two f. cottages, Horsell-rd., Woking, r. 19*l.* 10s., 325*l.*—By *Debenham, Tewson, & Co.* (at Newport): "Scyborwen" Estate, Llantrissant, Monmouth, containing 41a. 1r. 12p., f., 2,100*l.*; the Home Farm, containing 131a. 0r. 6p., f., 2,100*l.*; several f. cottages and enclosures, containing 67a. 1r. 0p., 2,520*l.*

AUGUST 28.—By *Newbon & Harding*: 7, Springdale-rd., Stoke Newington, u.t. 76 yrs., g.r. 6*l.* 4s. 6d., 300*l.*; 275 and 277, City-rd., St. Lukes, u.t. 45 yrs., g.r. 34*l.*, r. 164*l.*, 1,105*l.*; 26, Lower Addiscombe-rd., Croydon, f., r. 35*l.*, 620*l.*—By *G. B. Hilliard & Son*: "Long Barns" and "Frays" farms, near Ongar, Essex, 423a. 2r. 26p., f., 4,680*l.*—By *E. Stimson*: 55 and 56, Wootton-st., Lambeth, u.t. 21 yrs., g.r. 14*l.* 10s., r. 72*l.* 16s., 255*l.*; 8, Alaska-st., u.t. 10 yrs., g.r. 10*l.* 10s., r. 33*l.* 16s., 45*l.*; 14, Uxbridge-st., Newington Causeway, u.t. 15 yrs., g.r. 2*l.* 14s., r. 26*l.*, 100*l.*; 16, Uxbridge-st., u.t. 18 yrs., g.r. 5*l.*, r. 28*l.* 10s., 90*l.*; 7 and 8, Uxbridge-pl, u.t. 19 yrs., g.r. 4*l.* 4s., r. 26*l.*, 100*l.*; 83 to 93 (odd) Ulverscroft-rd., East Dulwich, u.t. 77 yrs., g.r. 30*l.*, 265*l.*; 15 and 17, Tindal-st., Camberwell, u.t. 71 yrs., g.r. 8*l.*, r. 57*l.* 4s., 400*l.*; 154, Wyndham-rd., with goodwill of a corn chandler, u.t. 12 yrs., r. 36*l.*, 50*l.*; 8, Balme-rd., De Beauvoir-rd., u.t. 36 yrs., g.r. 4*l.*, r. 55*l.* 18s., 310*l.*; 145 and 147, Lorrimore-rd., Walworth, u.t. 63 yrs., g.r. 9*l.* 5s., r. 56*l.*, 535*l.*; 27, Copleston-rd., Peckham, u.t. 87 yrs., g.r. 5*l.* 15s., r. 28*l.*, 223*l.*; 19, 21, and 23, Tappesfield-rd., Nunhead, u.t. 86 yrs., g.r. 14*l.* 15s., r. 54*l.* 12s., 225*l.*; 5, Fairlawn-ter., Sydenham, u.t. 71 yrs., g.r. 8*l.* 10s., r. 40*l.*, 260*l.*—By *M. Long*: 26, Pembroke-gardens, Kensington, u.t. 55 yrs., g.r. 1*l.* 10s., r. 95*l.*, 770*l.*; 85, The Grove, Hammersmith, u.t. 77 yrs., g.r. 9*l.* r. 50*l.*, 510*l.*

AUGUST 29.—By *Barker & Neale*: 34, Radnor-st., Chelsea, u.t. 51 yrs., g.r. 6*l.*, 400*l.*—By *Broad & Wiltshire*: 8, Denbigh-ter., Bayswater, u.t. 53 yrs., g.r. 6*l.*, r. 35*l.*, 330*l.*—By *J. Revill*: 145, Grove-st., Deptford, u.t. 45 yrs., g.r. 2*l.*, r. 27*l.* 6s., 120*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; l.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	11 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch "	3 0 0	5 0 0
Elm "	3 10 0	4 15 0
Fir, Dantsic, &c.	1 15 0	3 10 0
Oak "	2 10 0	4 10 0
Canada	5 10 0	6 10 0
Pine, Canada red	2 10 0	3 10 0
" yellow	2 0 0	5 5 0
Lath, Dantsic ....fathom	5 0 0	6 0 0
St. Petersburg	5 0 0	7 0 0
Wainscot, Riga, &c. ....log	0 0 0	0 0 0
Deals, Finland, 2nd and 1st. std. 100	7 15 0	10 0 0
" " 4th and 3rd	7 0 0	7 10 0
Riga	6 0 0	8 10 0
St. Petersburg, 1st yellow	9 10 0	14 10 0
" 2nd "	7 10 0	9 0 0
" white	7 0 0	10 0 0
Swedish	7 0 0	15 0 0
White Sea	8 0 0	17 0 0
Canada, Pine, 1st	15 0 0	26 0 0
" 2nd	10 0 0	16 10 0
" " 3rd, &c.	7 0 0	10 0 0
" Spruce, 1st	8 15 0	11 0 0
" 3rd and 2nd ..	6 10 0	8 10 0
" " New Brunswick, &c.	6 0 0	8 0 0
Battens, all kinds	5 0 0	16 0 0
Flooring Boards, sq., 1 in., prepared, First	0 10 0	0 14 0
Second	0 8 0	0 10 6
Other qualities	0 6 0	0 7 9
Cedar, Cuba ....foot	0 0 4	0 0 4½
Honduras, &c.	0 0 4	0 0 4½
Mahogany, Cuba	0 0 4½	0 0 6½
St. Domingo, cargo average ..	0 0 5	0 0 6½
Mexican "	0 0 4½	0 0 5½
Tobasco "	0 0 5½	0 0 6½
Honduras "	0 0 5	0 0 6½
Box, Turkey ....ton	5 0 0	13 0 0
Rose, Rio	14 0 0	19 0 0
Bahia	13 0 0	18 0 0
Satin, St. Domingo....foot	0 0 6	0 1 3
Porto Rico	0 0 9	0 1 3
Walnut, Italian	0 0 4	0 0 7
METALS.		
IRON—Bar, Welsh, in London tn	6 10 0	6 17 6
" " at works in Wales	6 0 0	6 10 0
" Staffordshire, in London..	7 0 0	8 0 0
COPPER—British, cake and ingot	63 10 0	64 10 0
Best selected	66 0 0	66 10 0
Sheets, strong	70 0 0	71 0 0
Chili, bars	60 5 0	0 0 0
YELLOW METAL....lb.	0 0 6½	0 0 6¾
LEAD—Pig, Spanish ....ton	13 5 0	0 0 0
English, com. brands	0 0 0	0 0 0
Sheet, English, 3 lbs. per square foot and upwards....	15 0 0	0 0 0
Pipe	15 10 0	0 0 0
ZINC—English sheet ....ton	25 10 0	26 0 0
TIN—Straits	97 0 0	0 0 0
Australian	98 0 0	0 0 0
English Ingots	100 0 0	0 0 0
OILS.		
Linseed ....ton	24 7 6	24 17 6
Cocoanut, Cochin	34 0 0	0 0 0
Cocoanut, Ceylon	31 10 0	32 0 0
Palm, Lagos	27 0 0	27 10 0
Rapeseed, English pale	31 5 0	0 0 0
" brown	29 15 0	30 0 0
Cottonseed, refined	21 10 0	0 0 0
Tallow and Oleine	21 0 0	40 0 0
Lubricating, U.S.	5 10 0	6 0 0
" refined	7 0 0	12 0 0
TAR—Stockholm....barrel	1 0 6	0 0 0
Archangel	0 14 6	0 0 0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

BECKENHAM (Kent).—For repairs and decorations at "Woodthorpe," Southend-road, Beckenham, Kent, for Mr. F. G. Lane. Mr. Edward Brown, architect, 21, Liverpool-street, E.C.:—

F. Cooper (accepted) £179 15 0

[No competition.]

BRENTWOOD (Essex).—For building two villa residences, with stabling, near Brentwood, Essex, for Mr. A. Clark. Messrs. Sherrin & Coltman, architects:—

Turner & Son	£1,450 0 0
Austin	1,310 0 0
H. Cornish & Sons (accepted)	1,285 0 0

CARDIFF.—For the erection of a Seamen's Institute, &c., at Bute-crescent, Cardiff. Mr. E. W. M. Corbett, architect, Castle-street, Cardiff:—

Chas. Shepherd & Son	£4,985 0 0
E. Turner & Sons	4,868 0 0
Burton & Co.	4,493 0 0
James Allan (accepted)	4,410 0 0

[All of Cardiff.]

CARLISLE.—Accepted for works in the erection and completion of ten houses in Howe-street, Botchergate, Carlisle, for Mr. Joseph Metcalfe. Mr. Geo. D. Oliver, architect, Bank-chambers, Carlisle:—

Carpenter and Joiner, T. & J. Nixon..	£445 0 0
Plumber, D. Thomson & Son....	104 10 6
Plasterers, R. M. Ormerod & Son ...	195 10 0
Painter, Wm. U. Ballantine	56 10 0
Slater, C. J. Nanson	109 0 0

[All of Carlisle.]

COMPETITION AND CONTRACTS.

COMPETITION.

Nature of Work.	By whom Advertised	Premium.	Designs to be delivered.
*New Municipal Buildings	Oswestry Twn Council	50l. and 20l.	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Two Cottages, Warehouse, and Stable, Leeds	Mr. J. Skelton	Thos. Winn	Sept. 9
Shop and Residence, Eastleigh, Southampton	Mr. J. J. Budd	Thos. Stopher	do.
Hatchwork, &c. Barton Stacey, Near Micheldever	.....	Westbury & Son	do.
Alteration to Chapel and School, Brigg	.....	W. A. Gelder	do.
*Broken Granite	East Ham Local Board	W. H. Savage	do.
*Fire Escape Staircases at Schools, Mitcham	Holborn Union	H. Saxon Snell	Sept. 10
*10-ton Steam Road Roller	Sutton (Surrey) L. B.	E. W. Cricksmay	do.
Work at Workhouse, &c.	Scarborough Union	*Official*	do.
Roofing Warehouses, &c.	Norwich Union	J. P. Pearce	do.
Nine Business Houses, New Tipperary	.....	R. P. Gill	do.
Water Supply Works	Ripley Local Board	*Official*	do.
Additions and Alterations to Police Stat'n	Cardiff Corporation	Wm. Harpur	do.
Distillery, Craigellachie, N.B.	.....	Chas. C. Doig	Sept. 11
Minister's House, Shepton Mallet	Trustees of the Centenary House	J. Ace Benyon	do.
Constabulary Barracks, Belfast	Board of Public Wks, Ireland	*Official*	do.
Heating and Drainage at Asylum, Londonderry	do.	do.	Sept. 12
*Making-up Carriageway and Paving Footways	Wood Green Local Bd.	C. J. Gunyon	do.
*Making-up Roads	do.	do.	do.
Vagrant Wards, Keswick	Cockermouth Guardns	G. D. Oliver	Sept. 15
Cast-iron Pillars, &c.	Cardiff Corporation	*Official*	do.
*Water Supply Works	Tadcaster U.R.S.A.	Brundell, Simmons & Co.	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Extension of Library Buildings	Handsworth U.S.A.	W. Henman	Sept. 15
*Oak Park Fencing	Battersea Burial Bd.	*Official*	do.
*Broken Granite	N. Walsham Loc. Bd.	do.	do.
*Widening Bridge, Ealing	G. W. R. Co.	do.	Sept. 16
*General Works, House Drains, &c.	Leyton Local Board	W. Dawson	do.
*Draining, Roadmaking, Kerbing, &c.	do.	do.	do.
*Roadmaking and Paving Works	Fulham Vestry	W. Sykes	Sept. 17
*Pipe and Brick Sewers	do.	J. P. Norrington	do.
*Paving Works	Greenwich Bd. of Wks	*Official*	do.
*Wrought-iron Girders, Trough Flooring, &c. Supply and Erection of Footbridges	M. R. Co.	do.	Sept. 19
*Register Offices	Islington Guardians	W. Smith	do.
*Earthenware Pipes	Buxton Local Board	J. Hague	do.
*Custom House, Blyth	Com. of H M. Wks, &c.	*Official*	do.
*Brick and Pipe Sewers, &c.	Smethwick Loc. Bd.	Harris & Harris	Sept. 19
Reservoir, Tank, Laying Water-pipes, &c.	Stainland-with-Old Lindley Local Board	G. & G. H. Crowther	do.
Memorial Hall, Brookeborough, Fermanagh	.....	Thos. Elliott	Sept. 20
*Public Baths and Washhouses	Stockton-on-Tees Corp.	K. P. Campbell	Sept. 22
*Market Hall	Billston Township Com.	Horton & Co.	do.
Infant School, near Aberearn	Mynyddislwyn Sch. Bd.	A. D. Edwards	Sept. 23
*Marine Park and Lake	Southport Corporation	*Official*	Sept. 24
*Repairing Manufacturing Buildings, Wandsworth	Messrs. R. Bell & Co.	.....	Sept. 25
*Telegraph Factory, Mount Pleasant	Com. of H.M. Works	*Official*	Sept. 30
New Cathedral, Letterkenny, Ireland	Bishop of Raphoe	Wm. Hague	Oct. 4
*Erection of Barrack Buildings, Shorncliffe	War Department	*Official*	No date
Forming Public Recreation Ground, &c.	Tunstall Local Board	A. R. Wood	do.
Sinking Shaft (170 fathoms)	Trimdon (Durham) Coal Co.	.....	do.
Restoration of Church, Llanfaredd, Radnorshire	.....	Ernest Collier	do.
Engine House and Engine Beds, nr Leeds	Birley Collieries	.....	do.
Sixteen Houses, Leeds	.....	Jas. Charles & Sons	do.
Methodist Church and Schools, Leicester	.....	A. H. Goodall	do.
New Schools	Norwich Training Coll.	.....	do.
Ironwork for Spinning Mill, Heywood, Manchester	.....	Potts, Son, & Pickup	do.
Two or Four Dwelling-houses, Sheffield	.....	J. P. Earle	do.

Those marked with an Asterisk (*) are advertised in this Number. *Competition, p.* lv. *Contracts, pp* iv. *and* vi.

CASTLE DOUGLAS, N.B.—For providing and laying sewer-pipes and executing drainage purification works at Castle Douglas, N.B., for the Local Authority. Mr. Jas. Barr, Engineer, 132, West Regent-street, Glasgow :—

Gibson, Dalmellington	£4,970 0 0
Parker & Sharpe	3,049 10 6
J. Morris & Sons	3,021 3 6
J. & S. Rae	3,003 19 8
R. C. Brebner	2,999 0 0
Sharpe	2,916 12 2
W. J. Flett	2,813 3 0
J. Carter	2,674 4 2
Pearson, Kilmarnock (accepted)	2,599 11 2

[Engineer's estimate, £2,682 3s. 7d.]

CHESTER-LE-STREET (Durham).—For rebuilding with cement concrete portions of a retaining wall at Chester Burn, Chester-le-Street, for the Durham and Chester-le-Street Highway Board. Mr. J. McGregor, District Surveyor, Stockley Heugh, near Durham :—

Goldsbrough & Kell	£170 0 0
John T. Simpson	142 10 0
John Carrick, Durham (accepted)	126 10 0

CHISWICK.—For the erection of a mission hall, crèche, &c. Mr. C. P. Edwards, architect, 7, Victoria-street, Westminster, S.W. Quantities by Mr. T. Woodbridge Biggs :—

H. Eydmann, jun.	£2,670 0 0
Chamberlen Bros.	2 314 0 0
J. Edwards & Son	2,300 0 0
Adamson & Sons	2,265 0 0
W. Oldrey & Co.	2,260 0 0
H. Fowler (informal)	2,241 0 0
W. & A. Atkinson	2,218 0 0
J. J. Bryant	2,050 0 0
S. Powell (accepted)	1,970 0 0

CLANE (co. Kildare).—For building Medical Officer's residence at Clane, co. Kildare, Ireland, for the Board of Guardians of Naas Union. Mr. Joseph Berry, C.E., architect, 67, Mountjoy-square, Dublin :—

J. Good	£1,047 0 0
J. Hyland, Naas (accepted)	1,020 0 0

DARTFORD (Kent).—For repairs to ten houses and constructing of new drains, &c. :—

Collins	£425 0 0
W. Francis & Co., Lacon-road, Dulwich (accepted)	418 0 0

LITTLEHAMPTON (Sussex).—For erecting school and house for Mr. Barford :—

Rowland Bros.	£3,519 0 0
P. Peters	2,650 0 0
Snewin Bros.	2,635 0 0
A. Burrell	2,580 0 0
W. Wallis	2,420 0 0
W. H. Sawle, Worthing (accepted)	1,966 0 0

LONDON.—For alterations, reparations, &c., to the "Prince of Wales" hotel. Mr. R. Cruwys, architect, Bank Chambers, 465, Brixton-road, S.W. Quantities by Messrs. Franklin & Andrews, 25, Ludgate-hill, E.C. :—

Chappell	£4,576 0 0
Turtle & Appleton*	4,410 0 0
McLachlan	4,393 0 0
Patrick & Son	4,318 0 0
Higgs & Hill	4,269 0 0
Candler & Sons	4,200 0 0
Nightingale	4,159 0 0
Burman & Sons	4,049 0 0
Downs	3,984 0 0

* Too late.

LONDON.—For alterations and repairs to the "Ordnance Arms" public-house, Lewisham-road, for Mr. H. Warren. Mr. Arthur E. Harris, architect :—

Spencer & Co.	£540 0 0
Walker	539 0 0
Greenwood	496 0 0
Holloway	484 0 0
Treweke	448 0 0

LONDON.—For rebuilding Nos. 53 and 55, Little Cadogan-place, S.W. Mr. J. Emes, architect, 151, Ebury-street :—

Roberts	£2,267 0 0
Gladding	2,200 0 0
Oldrey	2,177 0 0
Nichols	2,100 0 0
Castle	2,055 0 0
Hewitt	2,050 0 0
Simmonds Bros.	1,888 0 0
Craske (accepted)	1,839 0 0
Rayment (withdrawn)	1,620 0 0

LONDON.—For taking-up an existing brick sewer in Hemmings-row, Charing Cross, and for the construction of a 4 ft. by 2 ft. 8 in. egg-shaped brick sewer in lieu thereof, including bell-mouth junctions, side entrance, and other works appurtenant thereto, for the Vestry of St. Martin-in-the-Fields, Westminster. Mr. Charles Mason, Surveyor to the Vestry :—

Geo. Bell	£654 3 9
Mowlem & Co.	540 0 0
A. Kellett	531 14 6
Mayo & Co.	510 4 0
J. Garton	440 14 0
J. H. Neave, Fulham-park-gardens, Fulham-road (accepted)	429 14 6

LONDON.—For the erection of new workshops in rear of 36, Borough-road, S.E., for Mr. P. Boswell. Messrs. Page & Stock, architects. Quantities by Messrs. Widnell & Trollope :—

Porter	£630 0 0
Canning & Mullin	575 0 0
R. C. Scutt (accepted)	560 0 0

LONDON.—For alterations at the Holborn Gladstonian Club, Devonshire-street, W.C. Mr. T. J. Holland, architect, 3, Little George-street, Westminster, S.W. :—

Pickford & Co	£388 0 0
Young & Lonsdale (accepted)	368 0 0
Clifford	361 15 9

LONDON.—For erecting new warehouses, Nos. 21 and 23, Mitre-street, E.C. Mr. M. E. Collins, architect. Quantities by Messrs. Batstone Bros. :—

Martin, Wells & Co.	£4,800 0 0
Ashby Bros.	4,679 0 0
T. Boyce	4,533 0 0
F. & F. Wood	4,468 0 0
Lascelles	4,450 0 0
Rider Hunt	4,270 0 0
Ashby & Horner	4,200 0 0
Hallamore & Son	4,129 0 0
W. Shurmur	4,095 0 0
Ward & Co.	3,967 0 0

LONDON.—For alterations and additions to the Upper Clapton Congregational Church and Schools. Mr. W. D. Church, architect :—

Dove Bros.	£4,200 0 0
J. H. Holloway	4,060 0 0
Woodward	3,890 0 0
W. Shurmur	3,780 0 0

LONDON.—For building public hall for the South Bermondsey Institute, Rotherhithe New-road, S.E. Mr. T. Aubrey, architect. Quantities by Messrs. Mills & Jones, Regent-street :—

A. White & Co.	£2,035 0 0
Gregory & Co.	1,944 0 0
Hart Bros.	1,868 0 0
Roome	1,859 0 0
Holloway	1,841 0 0
B. Wells	1,799 0 0
Battley (accepted)	1,727 0 0

LONDON.—For alterations at "The King's Arms," Commercial-road East, for Mr. Medworth. Mr. J. W. Brooker, architect :—

Battley	£980 0 0
Garrett	878 0 0
Shurmur	873 0 0
Holland	845 0 0

LONDON.—For alterations at the "Northumberland Arms," Southwark-park-road, for Mr. John Lipman. Mr. Edward Brown, architect, 21, Liverpool-street, E.C. :—

S. Pocock (accepted)	£350 0 0

[No competition.]

LONDON.—For marble mosaic paving at St. James's Church, Spanish-place. Messrs. Goldie, Child, & Goldie, architects, Kensington-square :—

Mainzer & Kempthorne, 18, Berners-street (accepted)	£178 10 0

LONDON.—For building stables, &c., at 31, Mowlem-street, Cambridge-heath, for Mr. F. Garner. Mr. Edward Brown, architect, 21, Liverpool-street, E.C. :—

H. Hemmingway	£283 0 0
Mower & Son	271 0 0
S. Goodall	260 0 0
Walker Bros.	257 0 0
J. A. Taylor	249 0 0
A. Hood	229 0 0
S. W. Hawkings	228 0 0
R. Edwards, jun.	175 0 0
W. Jackson (accepted)	145 0 0

LONDON.—For decorations and sanitary work to 27, Elvaston-place, Kensington. Messrs. Sherrin & Coltman, architects :—

H. Cornish & Sons (accepted)	£320 0 0

NEWPORT (Mon.).—For the erection of a new infant's school at Upper Cwmbran, near Newport (Mon.), for the Llanvrechva Upper School Board. Mr. E. A. Lansdowne, architect, High-street, Newport, (Mon.) :—

H. B. Sketch	£1,804 0 0
J. Linton	1,560 0 0
A. H. Bailey	1,520 0 0
J. Jenkins	1,300 0 0
H. W. Parpitt	1,270 0 0
R. Wilson, Pontnewydd (accepted)	1,242 3 6

NOTTINGHAM.—For the erection of three shops, bakery, stabling, &c., at Stapleford, near Nottingham. Mr. T. W. Latham, architect, Sandiacre, near Nottingham :—

Webster & Gelsthorpe, Hucknall	£1,266 0 0
J. Bull, Long Eaton	1,160 0 0
F. Perks & Son, Long Eaton	1,155 0 0
J. W. Priestly, Nottingham	1,112 0 0
G. Bastable, Sandiacre	1,095 0 0
C. Moult, Stapleford	1,084 0 0

NOTTINGHAM.—For the erection of two houses at Beeston, near Nottingham. Mr. T. W. Latham, architect, Sandiacre, near Nottingham :—

Bull	£1,081 0 0
Youngman	1,040 0 0
Perks, Long Eaton (accepted)	995 0 0
Fletcher	893 0 0

PLYMOUTH.—For the erection of additional show rooms and stores, &c., at Plymouth, for Messrs. Service & Co. Mr. James Harvey, architect and surveyor, Bedford-chambers, Bedford-street, Plymouth :—

J. H. Palmer	£657 0 0
W. S. Warren	620 0 0
G. B. Turpin	611 0 0
J. Parson	598 0 0
Lethbridge & Son	580 0 0
Palk & Partridge	577 0 0
Pellow & Jago	570 0 0
J. H. Blackell	557 0 0
Tozer & Son	557 0 0
S. Roberts	555 0 0
T. May	547 0 0
Pellow & Prout	536 0 0
Wm. Trevena	534 0 0
C. J. Payne	516 0 0
W. E. Blake	498 0 0
W. T. Bone	480 0 0
A. N. Coles (accepted)	459 0 0

[All of Plymouth.]

PLASHET (Essex).—For boundary walls, drainage, &c., at the Industrial Schools, Plashet, for the Guardians of the Parish of St. George-in-the-East. Messrs. Wilson, Son, & Aldwinckle, architects. Quantities supplied :—

Staines & Son	£3,426	0	0
Taylor, A., & Co.	3,131	13	0
Willson, C.	2,879	0	0
Todd, G. E.	2,853	0	0
Holland, J. (accepted)	2,655	0	0

PLYMOUTH.—For re-building premises, No. 10, Treville-street, Plymouth, for Mr. J. White (exclusive of plumber and gasfitter, smith and ironfounder). Mr. James Harvey, architect. Quantities by the architect :—

P. Blowey, Plymouth	£590	0	0
J. P. Berry, Plymouth	580	0	0
S. Roberts, Plymouth	563	0	0
S. W. Sanders, Plymouth	550	0	0
T. Kennady, Plymouth	520	0	0
A. N. Coles, Plymouth	498	0	0
T. May, Plymouth	498	0	0
Lapthorne & Goad, Plymouth	498	0	0
Jenkin & Son, Devonport	495	0	0
Reed, Blight, & Co., Plymouth	493	0	0
G. Shellabear, Plymouth	492	0	0
Lethbridge & Son, Plymouth	475	0	0
Tozer & Son, Plymouth	464	0	0
W. Pellow, Plymouth	445	0	0
W. Trevena, Plymouth	444	0	0
S. Harvey, Plymouth (accepted)	434	0	0

SALTASH.—For the erection of Wesleyan Chapel and Sunday Schools, at Saltash. Mr. H. J. Snell, architect, 13, Courtenay-street, Plymouth :—

Tozer & Son	£4,490	0	0
J. P. Berry	4,200	0	0
T. May	3,973	0	0
R. T. Jenkin	3,970	0	0
G. Shellabear	3,950	0	0
J. T. Brooking	3,948	0	0
W. T. Bone	3,889	0	0
Lapthorne & Goad	3,868	0	0
Palk & Partridge	3,864	0	0
A. R. Lethbridge & Son	3,830	0	0
Reed, Blight, & Co., Limited	3,674	0	0
W. Trevena	3,647	0	0
J. Finch, Plymouth*	3,628	0	0

*Accepted subject to reduction.

SIDDICK.—For the erection and completion of thirty dwelling-houses, at Siddick, near Workington, Cumberland. Mr. J. S. Moffat, architect, 53, Church-street, Whitehaven :—

Thomas Maudle	£4,248	0	0
Jonathan Young	4,220	0	0
James Coulthard	4,092	0	0
James Fletcher, Workington*	3,810	0	0

* Accepted.

SOUTHAMPTON.—For constructing the new pier at Southampton. Mr. James Lemon and Mr. E. Cooper Poole, joint engineers. Quantities supplied by Mr. J. H. Blizard and Mr. H. J. Weston :—

J. Mowlem & Co., Westminster	£33,282	0	0
E. Howell, Poole	29,611	0	0
E. C. Frere & Co., London	29,589	0	0
E. J. London & Co., Newport, Mon.	28,880	0	0
J. W. Roe & Co., Southampton	27,425	0	0
Morgan, Isted, & Morgan, Southampton	26,438	0	0
J. Bull, Sons, & Co., Southampton	26,247	0	0
A. Thorne, London	26,180	0	0
H. J. Sanders, Southampton	26,142	0	0

[Engineers' estimate, £29,500].

SOUTH SHIELDS.—For the erection of police-courts, fire-brigade depôt, residence for chief constable, and officers' quarters, at South Shields, for the South Shields Corporation. Messrs. Perkin & Bulmer, architects, Leeds :—

W. J. Robertson	£15,330	0	0
R. Goodwin & Son	13,142	0	0
C. Nichol	13,036	0	0
Obank & Sons	12,895	0	0
Haswell & Wolf	12,520	0	0
Tyne & Graham	12,050	0	0
Simpson	11,967	0	0
Reid, Blight, & Co.	11,963	0	0
R. Allison	11,918	0	0
Middlemas Bros.	11,650	0	0
R. D. Scott	11,618	0	0
J. Elliot	11,580	0	0
Armitage & Hodgson	11,487	0	0
J. Howe, West Hartlepool*	10,985	0	0

* Accepted.

TOTTENHAM.—For alterations and additions at the "Antwerp Arms," Church-road, Tottenham, N. Mr. John E. Pinder, architect, Bridge House, South Tottenham :—

Yardley & Son	£673	0	0
F. Vollar	658	0	0
H. Knight & Son	595	0	0
J. Linzell	572	0	0
Stockwell	450	0	0

TUNBRIDGE WELLS.—For the erection and completion of three attached houses, for the Hon. J. M. O. Byng, J.P. Mr. W. B. Hughes, architect, Tunbridge Wells :—

Penn Bros.	£4,929	0	0
T. Ryder	4,420	0	0
R. Langridge	4,399	0	0
White & Humphreys	4,398	0	0
Strange & Sons	4,386	0	0
J. Jarvis	4,378	0	0
R. Avard, Maidstone (accepted)	4,293	0	0

WOOD GREEN (Middlesex).—For alterations at the "Lordship Tavern," Lordship-lane, for Mr. J. C. Pitt. Mr. E. Howard, architect and surveyor, Tottenham :—

F. Vollar	£595	0	0
Yardley & Son	565	0	0
A. Monk (accepted)	535	0	0

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